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CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

The Gathering at Savannah, Editorial Telegraphic Correspondence 541
Briefly Told..... 542

Arguments that Refute themselves—Mayor Cleveland's Vetoes Sustained—The Port Jervis (N. Y.) Kaleidoscope—Cheaper Gas for Grand Rapids, Mich.—A Sensible Letter—The Chelsea (Mass.) Hearing.

Notes on Purification, by Mr. S. W. Durkin..... 543
*A Method of Deodorizing Foul Lime, by Mr. R. Beynon..... 543
*The Latest Improved Loomis Gas Apparatus..... 544
The Use of Gas for Cooking, Heating and Trade Purposes, by a Gas Inspector—Concluded from page 511..... 546
Lime versus Cement Mortar..... 547
Compressed Air for Power Distribution..... 547
*Progress of Work on the Ferranti System, London..... 548
The Proposed Municipal Electric Lighting Plant, Peabody, Mass... 549
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 551

To Take Charge at Galveston—Hints from Fort Worth, Tex.—Decision of Court of Appeals in Case of Bohan vs. Port Jervis (N. Y.) Company—Mortgage Placed on the Quincy (Mass.) Works—The Ellert Gas Fixture Inspection Order, San Francisco, Cal.—Is the New Jersey Gas Tax Constitutional?—Suit against the Louisville (Ky.) Gas Company—The Manchester (N. H.) Suit Settled—Fuel Gas Company for Boone, Ia.—Killed by the Electric Current—Praising a Gas Company—Inspector Ford's Annual Report—Death of Richard Enright—In Charge at Jeffersonville, Ind.—The Gas is not Bad—Detroit's Gas Men—Trustees, Troy (N. Y.) Company—Public Lighting, Toronto, Canada—And Many Other Items.

The Market for Gas Securities..... 554

[Telegraphic Editorial Correspondence.]

THE GATHERING AT SAVANNAH.

SAVANNAH, GA., October 15, 1890.

Dear JOURNAL: The first day's proceedings in the Eighteenth Annual Convention of the American Association having been completed, I hasten to forward you some account of the same. In the first place, the journey out by rail from New York was completed without any special incident, although the trip was commenced in disappointment, for one of our fellow-travellers—Secretary Nettleton, of the New England Association—at the last moment found it impossible to make Savannah, in that coal was scarce in the sheds of the Derby Gas Light Company, wherefore Mr. Nettleton had to organize and conduct a foraging campaign in Philadelphia. Regretfully we bade him good-bye as he left us to go out into the gloom of the Pennsylvania Company's Quaker City depot, and our best hope is that, even if he missed Savannah, he secured the black diamonds. I might further say that, while train run No. 23, South, on the Penna. Company's schedule is all right as far equipment goes, it is a pity the roadbeds of the allied lines south of a certain busy center in the "Old Dominion" are not a trifle better lined up. However, we got here, "all the same;" and although rather early on the scene, we were not the first by any means to report. Secretary Humphreys, through his official notices, gave your readers and the members some index of what they might expect in respect to hotel accommodations at the De Soto Hotel. But the facts in the case are that he did not say half enough in praise of this elaborate and beautiful structure. Superb about expresses it. To come nearer to our story, however. The arriving delegates and guests were at once put at ease by a hospitable and cordial reception at the hands of some one or more of the local committee, the members whereof seemed to be nothing short of ubiquitous. Here, there and everywhere, no labor seemed too great, no fatigue too deterring, and such attentions could not fail to restore the smile of contentment to the faces of those that hours of travel had wearied. Wednesday was ushered in with magnificent weather. Indeed the sunniest sky that ever warmed the Sunny South was our portion for the opening day, and the air was as balmy as that about which versifiers frequently rave over. The reception accorded the Association by the local authorities was something novel in its history, and I must say that it was very pleasing to those who participated. Everyone who knows President McMillin knows that he does not waste much time, hence it was not long before the regular proceedings were smoothly underway. No jar, no friction, everything was as it should be. The opening attendance was not as numerous as might have been; but still 150 handed in their cards, and amongst the prominent guests I noted Mr. Barker, of the Massachusetts State Commission, whose striking personality was just as unruffled as though he never knew what it was to face the "indignant consumer," or "chronic kicker," in a judicial capacity, either at Chelsea, or elsewhere. The membership applications were surprisingly and gratifyingly large, some 35, if memory serves me right, having been received. The papers, of which 5 were read to-day, were interesting and valuable, and the discussions they provoked were of the crisp and bristling sort that one can find much instruction in. The arrangements for the meeting, in respect to meeting and committee rooms, are simply perfect, and this

busy Southern mart, with her generous and hospitable inhabitants, is bound to become one of the most important trade centers of our country. Savannah is a most beautiful and attractive city, and we one and all owe the committee that, a year ago, named it as the current meeting place a hearty vote of thanks. The record of the day, in respect to the entertainment of the ladies who braved the long journey—it is regrettable that they are not present in greater numbers—is in keeping with that which I have said about the meeting proper. The programme prepared by the Ladies Reception Committee was a most elaborate one, and our fair hostesses have really vied with one another in the warmth and cleverness of their attentions. The Reception Committee is as named:

Mrs. A. G. Guerard,	Mrs. A. C. Humphreys,
Mrs. A. E. Boardman,	Mrs. Thos. Turner,
Mrs. H. M. Comer,	Mrs. B. A. Denmark,
Mrs. J. M. Lang,	Mrs. H. H. McKee.
Mrs. Thos. Gadsden,	Mrs. D. Douglas.

That they have been attentive, considerate and courteous goes without saying; that their attentions have been appreciated also needs no affirmation. In fact, it has been a continual round of pleasure, with the inviting knowledge that as it was to-day so is to be to-morrow and "the day after." So far I may say that every one is pleased and happy, and with that pleasant assurance let me say "good-night." I will forward another budget to-morrow.—***.

October 16th, 1890.

I will begin to-day's budget by forwarding now what I should have sent you last night. The officers elected were:

President—John P. Harbison.
First Vice-President—W. H. White.
Second Vice-President—A. E. Boardman.
Third Vice-President—W. H. Pearson.
Secretary—C. J. R. Humphreys.

The Association has decided to accept no more banquets, but will hereafter feed itself. It may, perhaps, not be so well fed, but the idea is one that the Journal contended for a dozen years ago. It was decided to hold the next convention in New York.—***.

October 17th, 1890.

Well, the business portion of the convention is at an end, and so is the banquet—at which 50 of the fair sex and 192 of their admirers were entertained. But the outing of to-day remains. With the memories of last evening rather vividly before one, it might not be in order to plump a verdict respecting the affair just now. However, those who were not present missed a royally good time.

Gloom thrust its frowning face over the assemblage when it was assured that Capt. White would not measure out the feast of reason, but with the ease of the world "who laughs with you," the company soon forgot its old love in the whirl of welcoming the new. Under the circumstances, Toastmaster Walton Clark bore himself bravely, becomingly and wittily.

For completeness and hospitality the De Soto banquet was what it ought to have been. Praise by telegraph fails to give satisfaction, so let me say that our Southern hosts are grand entertainers. Indeed, the Eighteenth Annual was in all instances flawless. Its technical lessons are important, its social side perfect. But, as "the carriage waits," now for the cotton press and the "seething" Tybee.—***

BRIEFLY TOLD.

Arguments that Refute Themselves.—On pages 550-51-52 of this issue will be found an article from the Boston *Herald* explanatory and defensive of the proposed action of the authorities of Peabody, Mass., in installing an electric lighting plant, not only for the performance of the public lighting, but to supply individuals as well. In fact, were it not that a temporary injunction had been issued in restraint, the authorities of Peabody would now be engaged in the supply of electric currents in that district. The argument on causing the injunction to be a permanency or not is to be heard before Judge Holmes, at Salem, in Supreme Court, some time this month; and in any event the decision of the lower tribunal will undoubtedly be reviewed by the full bench at the November term. The *Herald's* article in defense of the proposed action is so lamentably weak, in respect to what it puts forward as reasons for justifying the desire of the Peabody authorities, that we simply ask our readers to look it carefully over, in the full belief that they will reach the conclusion that out of its own words it is condemned. If the Boston daily has told the truth, we are impelled to remark that the people of Peabody and Danvers must be very sapheaded, if their ordinary, everyday avocations must be controlled and carried out by means of governmental authority. They seemingly go beyond paternal supervision in those towns; they evidently like to feel the leash of dependence.

Mayor Cleveland's Vetoes Sustained.—Some time ago we noted that, with wonderful complaisance, the Board of Aldermen of Jersey City, N. J., granted one or more opposition gas and electric light charters, and that when the suspicious measures came before Mayor Cleveland for his sanction he promptly rebuked their framers by vetoing them. An attempt was subsequently made by the bolder of the set who favored the schemes to have them adopted over the Mayor's objections, but, to the credit of the newly-awakened consciences of others of the Board, the vetoes were sustained.

The Port Jervis (N.Y.) Kaleidoscope.—The changes in the situation at Port Jervis, N. Y., are frequent, to say the least. The following, from Mr. W. E. Fullagar, under date of the 15th inst., can be depended on to show in whom the ownership of the Port Jervis gas plant is vested at present: "In your last issue I read an item stating that Mr. J. J. Dillon has bought my lease from me. It is not so, as we could not come to terms, and I still have it. I expect to keep it, as I think it can be made a very profitable property."

Cheaper Gas for Grand Rapids, Mich.—Mr. Gilbert, of the Grand Rapids Gas Company, is true to the old-time policy (that has brought him such success) of reducing the selling rate when it is possible to do so with justice to all the interests concerned. The new plant and the growth of the city have enabled him to duplicate his past liberality—and even a glance at the new scale must carry the conviction that gas is to be surprisingly cheap at Grand Rapids—even cheaper than its people might ever have hoped for. The new scale (it goes into effect on January 1st) places the net rate at $1 per 1,000 feet for all monthly bills over 700 cubic feet, and $1.50 per 1,000 for less than 700 cubic feet. At the end of the year a rebate of 20 cents per 1,000 feet will be given to all those who have used during the twelvemonth one million cubic feet, while a rebate of 10 cents will be allowed those who have used more than one-half million and less than one million cubic feet in the year. Liberal, certainly.

The people of Danielsonville (Conn.) are complaining about the quality of the gas that is furnished them.

A Sensible Letter.—A correspondent of the *Scientific American* is responsible for the following, which has the right ring about it:

"Another of those frequent kerosene oil tragedies has just occurred in West Ringe, N. H., where a woman and child have been burned to death. Being in the lamp and oil stove business, I think it advisable to furnish a few hints in connection with the immediate cause of such disasters. Before proceeding further, I must remark that the present system of burning oil, both in lamps and oil stoves, seems like a satire upon this progressive age. A flame oxygenated by air currents to the fiercest heat is placed directly in contact with a brass tube through which all the oil consumed has to pass. Of course, this tube being always made of brass, is one of the most rapid conductors of heat, and soon becomes excessively hot. A better device for generating explosive gas could hardly be conceived. The worst of it is that the gas thus rapidly generated falls into the oil fount and is all ready for an explosion the moment that the smallest part of it comes in contact with fire. A slight current of air will often convey some of this gas to the flame, when a conflagration or explosion is sure to follow. If the numerous inventors who read your instructive journal could substitute some device for the present mechanical and scientific outrage, something not too complicated and expensive, I risk nothing in asserting that such a device, if brought before the public in a business way, would become universal. The horrors just referred to have now become so frequent that they receive only a brief and passing notice in the daily papers."

At the continued hearing before the Massachusetts Board of Gas and Electric Light Commissioners, on the petition of certain residents of Chelsea, Mass., to compel the Chelsea Gas and Electric Light Company to better its service and reduce its rates, the defendant seems to have had by far the best of the proceedings. For instance, the Hon. C. A. Campbell, who was the first witness, testified that he had been in the coal business in Chelsea for 30 years, and used both electric lights and gas in his residence and office. He was satisfied with the price and quality of the service, and believed the Company furnished light as cheaply as it possibly could. He owned no stock in the Gas Company, and should increase the number of his lights shortly. George H. Buck, of Messrs. G. H. Buck & Co., lumber dealers, said he had two places of business in Chelsea, and used both gas and electric arc lights. He was informed that they paid for more electric lights than any one else in the city, and thought both the electric and gas lights were satisfactory. He believed, in fact, that they were as good as any others that he had ever seen, and had no complaint to make on the price. Mr. Thomas P. Robinson, an electrical expert, testified that the Chelsea plant was well laid out and equipped. The hearing was continued.

[A paper read before the Southwest of England District Gas Managers' Association.]

Notes on Purification.

By Mr. S. W. DURKIN.

In touching on the subject of the purification of gas by what is now known as the air process, I do not profess to give you anything that is new, but rather confirmatory evidence of what others have accomplished in this direction. It was our President who suggested to me that I might give my experience on this interesting subject—that is, the introduction of air as an adjunct in purifying gas, or rather the oxygen contained in it. No doubt, Mr. Valon's experiments at Westgate-on-Sea and at Ramsgate have given an impetus to many minds to see what could be done before determining to take up the oxygen process pure and simple; and however diverse opinions may be on the matter, something has been attempted and done to simplify the purifying process.

In these "Notes," desiring to be as plain as possible, I do not propose diving into the refinements of the subject, but to merely lay before you a practical statement, and leave you to settle the *pros* and *cons* in your own minds. I have had the air-oxygen process in operation now for nearly twelve months, and will give you a comparative statement of the working, with and without it, for six months.

The respected President of the Southern District Association of Gas Engineers (Mr. T. May, of Richmond), in his inaugural address to the members in February last, gave a very full account of his experience with air, and he has informed me recently that he still continues its use, being well satisfied with the outcome. In Mr. May's case, as in my own, the air is introduced into the crude gas by working the gauge on the outlet of the hydraulic main at a vacuum; whilst others are of opinion that it should be taken in at the outlet of the washer. This latter mode, however, would entail special machinery for the purpose. In any case the crude gas, with its air or oxygen, is drawn through horizontal pipe condensers; thence driven through the washer and rotary scrubber (invented by Mr. J. Birch Paddon, formerly of Brighton), and then through an ordinary scrubber on Livesey's board system. It proceeds through a dry scrubber filled with coke, and on to the lime purifiers first, of which there are four, and thence to the oxide purifiers, each of which is 32 ft. by 20 ft. by 5 ft. The air is drawn in through a meter at about $\frac{1}{16}$ to $\frac{1}{6}$ vacuum, and the intake is read off the index every hour, a regulating cock being placed on the meter outlet. A sensitive governor would perhaps be better.

I now give you a comparative statement of six months' working with and withot air:

Production of gas from January to June...	1889.....	134,330,000 cu. ft.
	1890.....	137,587,000 "
Increase.....		3,257,000 "
Average per cent. of air	1889.....	*nil.*
	1890.....	1.85
Lime purifiers changed	1889.....	16
	1890.....	17
Increase.....		1
Additional cost for lime (1890)		0.07d. per 1,000 cu. ft.
Oxide purifiers changed	1889.....	23
	1890.....	2
Decrease.....		21
Labor, per 1,000 cu. ft. of gas made for lime and oxide.....	1889.....	0.39d.
	1890.....	0.13
Difference.....		0.26d.
Sulphur in spent lime.....		12.5 per cent.
Sulphur compounds (Harcourt's test, and occasionally verified by the referees' test).	1889.....	Variable up to 40 grains.
	1890.....	Average 16.5 grains.

With an increased production of gas the cost for lime was but a trifle more; and from the experience of Mr. May, as described in the address already alluded to, you will observe that the cost per 1,000 cubic feet is much decreased with large purifiers. But with this system you may do more work in a given area than under the ordinary method where no restrictions are placed as to sulphur compounds. The benefits I have experienced may be summed up thus: By working at a vacuum there is less accumulation of carbon in the retorts, a smaller number of choked pipes, the extraction of carbonic acid and sulphureted hydrogen go on together, and sulphur compounds kept down to below the allowed limit; and although the sulphur to some extent at present is lost, the portion that goes forward is, as usual, retained in the oxide boxes. The smaller the number of boxes cleared and renewed is a great saving of nuisance in the neighborhood of gas works; for the lime heap being already oxygenated does not steam, and throw off sulphureted hydrogen, etc., to say nothing of less wear and tear of plant, and of the men; and though I am not under the sulphur clauses, it is very satisfactory to me to be enabled to send out a purer gas than formerly without going to an enormous outlay for plant.

There is never a "rose without a thorn," and in this case some attention is required; and I have to thank Mr. Frank Durkin, my works assistant, for the attention he has given to this process. Owing to the increased temperature of the lime, which condition is essential to success, the water of hydration is gradually driven forward out of the lime into the receivers or into the bottom of the oxide boxes, from whence it should be removed as becomes necessary. The lime (samples of which, taken from each tier, are before you, and also from the Westgate gas works), when removed, except that in the top tier, is rather dusty for the men. But a little consideration allays the effect of this; and on the whole there is more "rose" than "thorn."

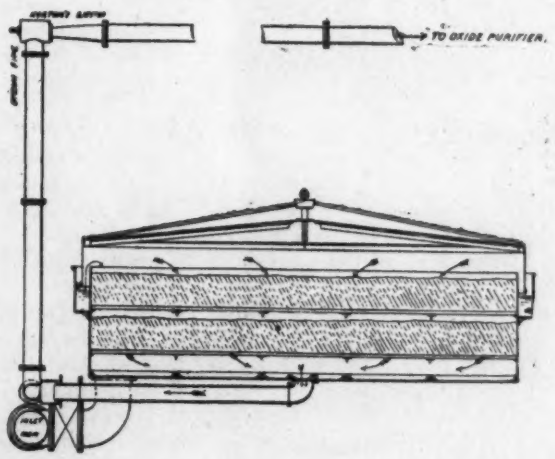
[A paper read before the Southwest of England District Gas Managers' Association.]

A Method of Deodorizing Foul Lime.

By Mr. R. BEYNON.

Having been asked by our Secretary to prepare a paper for this meeting, I consented (though with great diffidence) to do so, bearing in mind the advice given to the younger members of the Association some years ago by our then President, Mr. Garnett, who said that "in attempting to teach others, we would learn much ourselves." I therefore propose to give you a description of the method adopted at the Torquay gas works to do away with the smell and nuisance caused by the emptying of a foul lime purifier. Whilst doing so to the best of my ability, I must disclaim any idea of its being entirely an original method, and would ask for the kind indulgence of the members for bringing it forward.

Before describing the apparatus required I think I had better give you, in brief, my reasons for adopting this process. Of late years the public have made frequent complaints of the bad smell from the works when a foul box is being emptied, although they are situated some two miles from the town; and it has therefore devolved on me to recommend some plan for my Directors to adopt to abate it. Of these there were several—viz., (1) to use oxide of iron; (2) to use oxide in conjunction with Cooper's liming process; (3) to use oxygen in conjunction with the lime; and (4) to ventilate the foul purifier before removing the lime. At first sight, the simplest and perhaps cheapest way out of the difficulty would seem to be to use the oxide alone; but as I have only four purifiers, it would have meant putting down two others for lime to remove the carbonic acid, and, again, I had not sufficient room for revivification, though this latter objection could have been overcome to a certain degree by the admission of a given percentage of air. The last and greatest objection I had to it was that I feared an increase of sulphur in the gas, which at present does not average more than 10 grains per 100 cubic feet. Cooper's liming process did not recommend itself to my Directors; and for the present they would not adopt the oxygen process, though I may say it is one I should have liked to have adopted. I still hope at some future time to do so. The last named was therefore the



one selected; and from my rough drawing and description I hope to make the working of it clear to the members.

As already stated, my purifiers are four in number. They are 20 feet square and 5 feet deep, and are situated in line, at two different levels. For the purpose of ventilating them I have made an 8-inch connection to each purifier. On the top of the inlet main runs a line of 8 inch pipes, with a tee-piece for each box, fitted with a stuffing-box and sliding connection piece, and blank flanges, as shown. At one end of the line of pipes I have fitted a Korting's steam ejector, after which the pipes are continued for some distance to act as a condenser, and finally end in an oxide of iron purifier which I use in connection with the sulphate works.

The method of working is as follows: I use the four purifiers together, and after No. 3 has shown a stain on the test paper, No. 1 is shut off, the cover lifted until an inch above the water seal, and a connection made to the ventilating main by removing the blank flanges, drawing the sliding piece out of the stuffing-box of the tee-piece, and coupling up to the connections on the purifier Steam is then turned on to the ejector, and air drawn down through the lime, until a slight vacuum is obtained. The lime soon begins to heat, and the ventilation is continued until it is cold again (in my own case this takes 72 hours), when it will be found that all the sulphureted hydrogen has been drawn off, and that the lime (although on close observation it gives off a faint odor) is, at a slight distance, totally inoffensive. By this means, instead of taking it out of the box by night, as I have had to do, I am able to do it during the daytime, which is, of course, a considerable saving in the expense for labor. I am also able to store the lime, and hope to establish a ready sale for it among the neighboring farmers; and this will still further help to reduce the expenditure under the head of purifying, etc. One thing I should like to try, had I one more purifier; and that is to see whether the (I will call it) ventilated lime would be of any more service in the purification in removing some of the bisulphide of carbon. Perhaps, in any discussion that this paper may lead to, some of the members may be able to enlighten me on this point.

The Latest Loomis Improved Gas Apparatus.

On Oct. 7th U. S. Letters Patent (No. 438,013) were granted to Mr. Burdett Loomis, of Hartford, Conn., for "certain new and useful improvements in gas making apparatus." Using the words in the specification—

This invention relates to the manufacture of illuminating gas or a high grade of fuel gas from hydrocarbon oil and steam in a single generating furnace, by means of downdraft or exhaustion of the steam and hydrocarbon vapors down through a body of fuel heated to the proper temperature for decomposing steam and converting hydrocarbon vapors into fixed gas.

The object of my invention is to produce a fair quality of illuminating gas or a high grade heating gas by a very simple operation in a single generating furnace, and to insure the complete decomposition of the steam and conversion of the hydrocarbons into a fixed gas by drawing them with the exhauster down through the heated fuel.

Another object is to provide a conveniently arranged and connected apparatus for most economically carrying out my process.

According to patents heretofore granted to me, air was drawn down through the body of fuel, causing its combustion with the generation of producer gas, and tarry vapors distilled from the coal were at the same time drawn down through the heated fuel, and the resulting mixed gas drawn off at the bottom. Steam, together with air and tarry vapors, was also drawn down through the fuel, resulting in both instances in the production of a mixed gas containing nitrogen. In such operation also the tarry or hydrocarbon vapors were subjected to an injuriously high temperature, and were apt to be destructively decomposed and burned by means of the accompanying air introduced for maintaining the combustion of the fuel.

In my present process I exclude the air during the generation of gas from hydrocarbon oil or from oil and steam, so as to obtain a product not contaminated with nitrogen, and I still avail myself of the advantages of exhausting or drawing the gas from the base of the generator, thus causing the hydrocarbon vapors as generated to pass down through the bed of heated fuel, and thereby insure their conversion into fixed gas.

A suitable apparatus for carrying out my process is illustrated in the accompanying drawings, in which Fig. 1 represents an elevation of the generator, boiler, or gas cooler, exhauster, and suitable connecting pipes and valves. Fig. 2 represents a vertical section thereof on the line $x\,x$ above the grate.

The generating furnace A is constructed in the usual manner of brick and inclosed within a tight iron jacket, being provided at the top with a fuel opening a, having a tight fitting lid x. The bottom of the fuel chamber above the grate is formed with a solid annular hearth w, inclined and extending inward from the outer walls and having a large central opening for the grate, which, as shown, is composed of brick arches b, extending transversely over the ashpit and supported in the side walls. The ashpit P is of about the same horizontal dimensions as the grate opening, and has a brick or tile floor B, which is supported upon parallel division walls or tile n, arranged in the wide outlet flue F in the base of the furnace. A lateral transverse wall b' separates ashpit P from the opening of the take-off pipe F'. A passageway f leads from ashpit P to the outlet flue F. The tiles n are set parallel and a short distance apart, so as to form an extended surface which is heated by the outgoing gases, and the heat of which may be utilized for superheating steam when it is passed upward through the fuel. Three openings a' are formed in the walls just above the hearth, and are provided with tight fitting lids or doors x'. An ashpit-opening u is formed below the grate, and in practice is provided with a tight fitting door. The take-off pipe F' is preferably lined with firebrick, and connects with the base h of the vertical tubular boiler H.

In the wall of the generator, preferably above its middle portion, I form a number of connecting annular flues—such as $D\,D'\,D''$—and connect the upper flue D with the interior of the generator by means of numerous ports d, as shown in Fig. 2. The number of annular flues may be increased if desired.

A supply pipe o for steam or oil connects with the lower flue D'', and a separate supply pipe c for steam or oil opens into the passageway a at the top of the generator. A supply pipe S' encircles the generator and connects with it just above the hearth w by branch pipes s', through which pipe and its branches may be supplied either steam or oil. The main steam supply pipe S may lead from the top of the boiler H or from any other boiler, and is provided with a controlling valve t. The various steam pipes connecting with the generator will be supplied by this main pipe S. A branch pipe s'' leads from it by connection (not here shown) into the take-off pipe F', connecting with the base of the generator.

The tubular boiler and gas cooler H is constructed with tube sheets near the top and bottom, and has at each end a smoke box between each tube sheet and each head of the boiler. The usual tubes are set in the tube sheets at top and bottom, and connect the smoke boxes and serve for the passage of gas which is drawn off from the generator. Water is circulated in the shell H around the tube for cooling the gas, and the supply of water may be so controlled that the steam will be generated by the outgoing hot gas. A gas take-off I connects with the upper smoke box of the boiler and with the exhauster T. A large escape pipe J leads downward from the exhauster and connects with the main J' for producer gas. Just below the exhauster a smoke escape pipe Y connects with pipe J and extends upward to the open air, being provided near the top with a blow-off valve y, for permitting the escape of smoke or other waste products when first kindling the fire or when first starting to heat up the body of fuel. A branch pipe K, having valve k, also connects with pipe J below the blower, and with the main K' for illuminating gas. Below the connections of pipe K and Y the pipe J is provided with a valve j. By means of the pipes J, K and Y and their valves the flow of the different kinds of gas is readily controlled.

An outlet pipe E (shown in Fig. 1) may connect with the annular flue D and extend into the seal box G for taking off water gas when steam is passed up through the generator. An escape pipe E' for water gas leads from seal box G. A small overflow pipe g leads from the side of the seal box at the proper height for maintaining the waterlevel, and extends into a well below. An engine z is provided for running the Roots exhauster. An iron floor W is supported on I-beams above the top of the generator, and serves to support the exhauster and engine, also to permit the workman to supply coal to the generator and to work the different valves of the steam, oil, and gas pipes, the handles of which are arranged in convenient position above the floor.

In order to generate gas, a fire is first kindled on the grate and supplied with fuel until a deep body of ignited fuel is formed, the fire being allowed to burn at first by a natural draft, and the lid x of passage a at the top of the generator being opened. After a sufficient body of fuel has been ignited and the valves j and k being closed, the blow-off valve y in pipe Y is opened and the exhauster is started, drawing air down into the fuel, and the resulting gaseous products are blown out through pipe Y. After a sufficient depth of fuel has been supplied to the generator and combustible producer gas is generated, valve y is closed and valve j is opened, permitting the producer gas to flow through the main

J either to a holder or directly to a furnace for combustion. Bituminous coal in the form of lime or slack is gradually fed in until it nearly fills the furnace, and the exhauster is kept running so long as it is desired to generate producer gas. The hot gas passing off from the base of the generator heats the brickwork in the ashpit and outlet flue F, and is cooled in passing through the tubular cooler H, so that it will not injure the exhauster in passing through it. A deep body of incandescent coal having been formed, heating or illuminating gas may then be generated as follows:

Lid x and valves j and y are closed, while valve k is opened and the exhauster is kept running. Steam is now preferably admitted by pipe o into the annular flue D'', and is successively passed through flues D', D', and D, in which it is superheated, and then passes out through ports d into the body of fuel. By the operation of the exhauster it is drawn down into the fuel, where it is decomposed, and the resulting water gas is conducted from the base of the generator through the tubular cooler into the main $K K'$. Steam may thus be passed for a short time alone through the fuel till its extremely high heat is reduced to a suitable temperature for generating carbureted hydrogen without undue waste by destructive decomposition. The first effect of the steam is to somewhat deaden the heat at the surfaces of the lumps of coal, while the interiors thereof still remain at a lively red heat. Soon after the first admission of steam hydrocarbon oil is admitted by pipe c at the top of the generator, or by pipes S s' above the hearth w.

In practice the oil is to be forced in by a pump or other pressure, or may be blown in by a steam jet. Should the temperature at first be too high for the passage of the hydrocarbon vapor through the whole body of fuel, the oil is preferably admitted into the lower portion of the fuel. Then as the temperature of the fuel becomes reduced to the proper degree, oil is admitted at the top. After starting the supply of oil the admission of steam is continued preferably through the superheating flues in the wall, and the steam and oil are decomposed and converted into gas together in the body of the fuel. The resulting water gas and carbureted hydrogen are continuously drawn down through the body of fuel and away from the base of the generator by the exhauster, and forced by it into the mains $K K'$, and thence into the seal box, from which they pass in the usual manner through the scrubber and purifier to the holder.

The quality or candle power of gas will be determined by the proportions of steam and oil admitted to the generator. In case a rich gas for illuminatiug purposes is desired the proportion of oil will be increased; but in case a heating gas is desired the proportion of oil will be diminished. I have found that a heating gas of good quality can be produced by supplying one gallon of oil for each one thousand (1,000) feet of water gas manufactured. This amount of oil gives a gas of strong odor, so that it may be safely used for domestic or other purposes, and also greatly increases its value as a heating gas.

In practice the larger proportion of steam is preferably admitted to the generator during the first part of the run, when the fuel is the hottest, and is gradually decreased towards the end of the run, while the larger proportion of oil is preferably admitted after the temperature has been lowered by the admission of steam and when the carbureted hydrogen gas can be generated without destructive decomposition and conversion into lamp-black. The proper time and the regulation of the oil supply will be readily determined by observation of the fuel through sight-holes and by means of a burner supplied by the gas as generated.

By means of my process the oil vapors are subjected to a sufficient extent of heated surfaces to insure their complete conversion into fixed gas; but the carbureted hydrogen is quickly drawn away from the heated surfaces, so that it will not be destructively decomposed. This is very important in order to secure the most economical and satisfactory results.

In operating the generator steam is preferably only passed down through the fuel, so that the exhauster may be kept running and the operation simplified as much as possible, and for the purpose of conducting the above process the outlet-pipe E, seal-box G, and main E'' may be omitted. When the temperature of the generator and fuel is too much

Fig. 1.

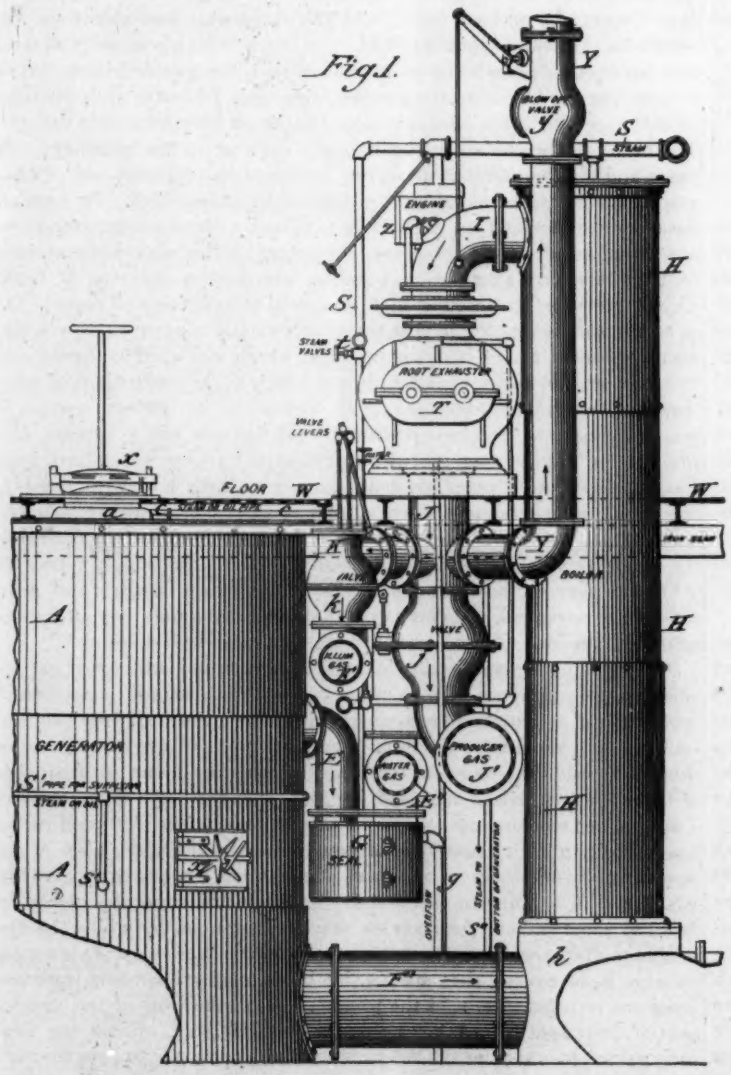


Fig. 2.

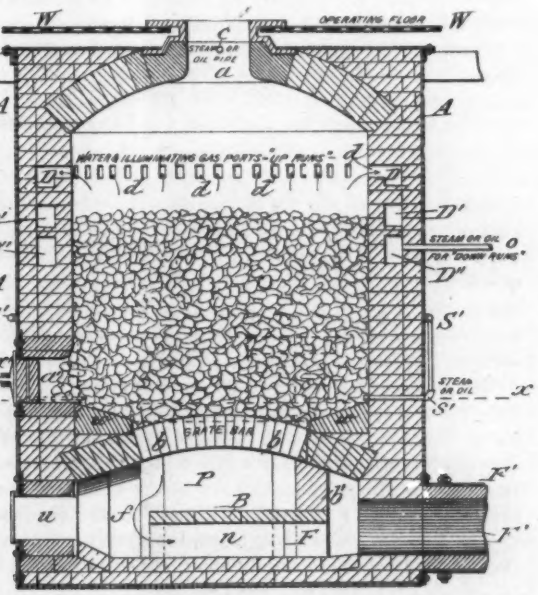
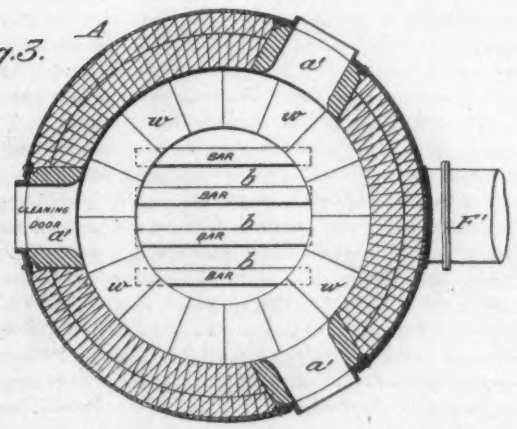


Fig. 3.



reduced for effectively converting steam and oil into fixed gas, both are shut off, valve *j* is opened, and valve *k* closed, and lid *x* at the top of the generator is opened, permitting air to enter the generator and again heat up the body of fuel by combustion to the proper temperature for again generating water gas and carbureted hydrogen. During the admission of air the exhauster is kept running, and the resulting producer gas is passed off through main J′ to the holder or to a furnace for immediate use.

Powdered asphaltum, rich coal, or other material rich in hydrocarbon may be supplied to the generator for conversion into carbureted hydrogen gas.

I have ascertained by experiment that better results may be secured by admitting the steam and oil separately, and therefore preferably pass the steam through the annular superheating flues, and thence into the generator, while the oil is dropped in from the top or is supplied at any other convenient point to the body of fuel. Oil may also be admitted by pipe *o* into the superheating-flue D″ and vaporized by passage through the flues above and the vapors passed through ports *d* into the fuel chamber for conversion into carbureted hydrogen by passage down through the fuel, the resulting gas being drawn off by the exhauster.

[Concluded from page 511.]

The Use of Gas for Heating, Cooking and Trade Purposes.*

By A Gas Inspector.

Coming now to the use of gas for trade purposes, I venture to think that not half enough is being done by the gas managers themselves to push business in this direction; the matter being chiefly left in the hands of enterprising manufacturers of gas appliances. But surely the moving spirits in all efforts to thus extend the knowledge of the numerous adaptabilities of gas fuel should be found amongst the managers themselves. The various industrial purposes to which coal gas is being found to be applicable seem well nigh inexhaustible. I have myself recently introduced a special form of burner for use in a peculiarly delicate operation in a factory, and the result is gratifying beyond all expectation. The proprietors cannot sufficiently express their satisfaction at the enhanced cleanliness and efficiency of their factory, combined with a considerable economy effected in the working. The smaller appliances—tailors' and hatters' heating irons, laboratory burners, high power burners for distilleries, chemical works, etc.—may be let out on hire on similar terms to cookers and gas fires.

With regard to gas engines, they have been sadly neglected by gas authorities; these useful motors not having received anything approaching adequate treatment at their hands. I do not see why they should not be let out on hire as are other gas appliances; and I would therefore suggest that some such facility should be afforded, more particularly with regard to engines of low horse power. Where high horse power is required the consumers are, as a rule, sufficiently wealthy to purchase an engine, and by so doing relieve the gas undertaking of the responsibility. I believe, however, that if the small types of engine, from ½ to 2 or 3-horse power, were let out on hire by the gas undertaking, the numbers put up would increase to an astonishing extent. They would be used by the grocers, coffee grinders and roasters, costumers, hair dressers, cutlers, tailors; in fact, wherever small rotary power is requisite.

I would strongly urge gas managers to do all in their power to push this business of letting out small gas engines. They have already more competition to face than many people think. Hydraulic, oil and other engines are now worked with wonderful economy, and already instances have come under my notice where these have displaced gas engines. Let gas engines look to their laurels. It is reported that the patents for the "Otto" engine are about to expire. If so, the engines will, in all probability, be supplied on much more reasonable terms than heretofore. Such a consummation is much to be desired, and I see no reason why, in a general way, gas companies should not unitedly bring pressure to bear upon manufacturers of this and similar plant, to produce their apparatus very much more cheaply than they do now. That this can be done, and at the same time allow a fair profit on the manufacture, I am perfectly sure; and the prohibitive prices of many of the best gas appliances militate enormously against the satisfactory increase of gas consumption in the direction under consideration. These remarks apply with equal force to the exorbitant charges still made for some classes of high power lamps, both for public and private use.

An important matter in connection with the introduction of apparatus is the fitting up of the supply of gas. I will venture to say, at the outset, that for work of this kind no reliance whatever is to be placed on the ordinary gasfitter. Some of the best firms employ intelligent men. These, however, are exceptions to the general rule, and if the work is to be satisfactorily executed, it must be done under the supervision of the gas works officials. In the first place, the arrangement of the pipes has often to be designed with great care; only those of the specified size being allowed. Consideration must be given to the position selected for the stove, and due provision made, where necessary, for carrying off the products of combustion. The surrounding circumstances cannot be ignored, as upon them will often depend the type of stove to be used—whether atmospheric or otherwise. Above all, *the stove itself should not be tampered with.* Let it stand on its own merits. If it is not satisfactory, after every care has been taken to ascertain that it is not the wrong one in the wrong place (a not unusual event), let it be returned to the maker, so that he may take the responsibility of doing what may be necessary to render it efficient.

In the matter just alluded to, many gasfitters sin most grievously. In a case recently brought under my notice, a heating stove of good make had been fixed, but did not give satisfactory results. It was complained that "there was no heat from it." The fitter who had put it up was called in. Instead of looking to his own work, which was sadly at fault (the connecting pipes being of much less than the specified bore), he, of course, put the blame on the gas fire. He took it down, and, pointing to the large flue at the back, explained to the unwary consumer that this was much too large—all the heat simply rushing up the chimney. He there and then closed it to about one-fourth of its original area, with a result which may be more easily imagined than described. In another case, a consumer had the good fortune to apply direct to the maker respecting a gas fire which was not satisfactory. The maker maintained that the stove was all right, and that the connection must be at fault. Urged, however, by the consumer, he agreed to examine and report. On investigation, it was found that the ¼-inch supply pipe on the stove had been connected with ¼-inch compo. pipe, which was itself so turned and twisted about as to resemble nothing so much as the contortions of some unhappy worm which had had the ill fortune to be troduen upon. It was scarcely to be wondered at that the gas fire was not a success. At other times it is the nozzles of the atmospheric burners which have been hammered up or enlarged by some ignoramus, with a view to remedying evils that are the natural result of bad work or uncleanly habits in using the stove. These and many other instances indicate the desirability of the retailers of gas having the matter of the supply pipes, for whatever purpose, as far as practicable in their own hands; and until this can be arranged, it seems to me that the success that may attend the efforts of the enterprising manager must be more or less limited.

A few simple suggestions upon the selection, fitting and use of gas appliances, etc., may not here be out of place. With regard to gas fires, I would never recommend the atmospheric stove, unless full provision can be made to carry off the products of combustion. Where this cannot be done, I should fix a stove in which an illuminating flame is used; but if there are no efficient means of ventilation in the room to be warmed, I should not recommend a gas stove of any description. I should rather lose custom in such a case than bring odium upon the whole class of gas appliances by employing a gas stove where it could not possibly give satisfaction. When an atmospheric fire is used, it is generally placed in front of some existing fireplace—a wise arrangement, by which the flue is able to discharge directly into the chimney. The most economical pattern is, of course, that which, by baffle plates, chambers, tortuous passages, or otherwise, robs the products of combustion of the greater part of their heat before they reach the chimney, and utilizes the heat thus gained in warming up air currents which are made to pass through chambers in the stove and then circulate around the room. There is a tendency, however, with this class of apparatus, to create an offensive smell when first lighted—probably owing to the low temperature of the air in the chimney presenting an obstacle to the free upward passage of the large volume of heated gases arising from the stove when full on. I have found the difficulty entirely removed by always leaving the stove turned low when first lighted. The volume of the products of combustion is thus but small; and they gradually and quickly warm the air in the chimney, and set up a current which will soon be sufficient to carry off the products arising from the stove when working at full power. A small matter, but one which gives considerable temporary inconvenience, is worthy of mention as indicative of the necessity of attention to details. Many firms make the cast flue on the back of their stoves of dimensions graduated in inches—say 2, 3 or 4 inches in diameter—according to the size of the stove. The ordinary ironmonger's elbow chimney flues will, therefore, fit these flues. In the case under notice the gas company's officials had fixed the name plate on this cast flue—thus preventing the use of an elbow flue; and consequently the stove would not

*London *Journal*.

work satisfactorily. It was not until the plate was removed that the stove could be used.

In conclusion, I will briefly summarize the remarks in this article as follows: In the first place, gas suppliers should advertise freely and judiciously, fully setting forth the advantages and the many capabilities of gas as fuel. Next, remove as far as possible every obstacle to the introduction of a supply of gas and the use of gas appliances. Let every endeavor be made to so educate the consumer as to enable him to use these appliances in the most advantageous way, and, by example, show what may be done by care and good management. Lastly, let no pains be spared to secure that every facility should be afforded to the apparatus fixed, so that no bad results may follow owing to a want of care in the selection either of the type of stove or the position in which it is to be placed. I believe that if these suggestions, supplemented or modified as may be necessary according to varied circumstances, are carried out, the result will be very gratifying alike to the gas consuming public and the gas world at large. The success that has so far attended the trade in gas appliances is in itself evidence of its value; and this might be much further enhanced if only gas managers and directors of gas undertakings would display more tact, energy and enterprise in their attempts to develop this important branch of their business.

Lime versus Cement Mortar.

Mr. W. S. McHarg, of Chicago, in a letter to the *Engineering Record*, makes the following suggestions, which will commend themselves to those who have occasion to "sift" the wheat from the chaff when making the rounds of the cement market as purchasers:

Your extracts from Prof. Ira O. Baker's paper on "Lime vs. Cement Mortar," in your issue of September 27, are interesting and valuable in strengthening opinion as to the quality of mortar which it is advisable to use in heavy buildings. Portland cement enters each day to a greater degree into the construction of tall buildings in this city, and its use will undoubtedly continue to increase. I desire, however, to enter a protest against the arbitrary, and I believe, incorrect change in the nomenclature of cements which Professor Baker suggests, or rather asserts.

By long custom the name Portland cement has come to mean any artificial cement, and is firmly fixed in this meaning in literature and in the minds of engineers. In distinction from this the cements made from rocks, into which enter proportions of lime and clay, producing, in varying degrees, hydraulicity, are called "Natural," "American," "Domestic," and "Roman," as Professor Baker tells us. Professor Baker further tells us that these names are inappropriate, and that they should all be classed as "Rosendale cement." To my mind, the most appropriate name for a class of cements, the material for which is found in nature ready for manufacture, is "Natural cements." Further, it would be entirely inappropriate and very confusing to apply to a class of cements, varying through a wide range of hydraulicity and activity, the name of one individual of this class which is, at present, on the market. Such action would lead to endless differences in the interpretation of specifications, or would require explicit and lengthy explanation.

This confusion or want of meaning is evident further on in Professor Baker's paper, when he states: "If great ultimate strength is required, then Portland cement must be employed; but if a quick-setting mortar is desired, then Rosendale cement must be employed." There is absolutely no such distinction between Portland and natural cements. Greater strength, more even quality and resistance to heat, are the distinguishing characteristics of Portland cement mortars. Quickness of setting or activity in any degree is not peculiar to Portland cement, for while in general Portland cement is considered slow-setting, yet the variation is great, depending in part on the freshness of the cement, and it is possible to obtain Portland cement of any desired degree of activity. Nor is activity a distinguishing mark of natural cements, varying in these as it does with freshness or the qualities of the rock. When Professor Baker says, "Rosendale must be employed," does he mean the North river cements, which vary somewhat in activity, or Akron, which must be quickly used, or Utica, which may lie for hours in the box without suffering in ultimate strength? In the light of his first quoted statement he means natural cement mortar; yet see how this varies.

If it were at all desirable to give this class of cements a proper name, "Roman" or "Boulogne" cement would be preferable to "Rosendale," as these names, so far as I know, are no longer used as brands for any cement in the market; but I think that all engineers will agree with me that the term "Natural cement" conveys the idea clearly as to what cement is desired, and in conjunction with the local name or brand, fixes the quality it is deemed preferable to use.

Compressed Air for Power Distribution.

Engineering says that within the limits of the city of Dresden the erection of steam boilers is prohibited, and with a view of developing small industries and also supplying electric light, the question of distribution of power has recently attracted considerable attention. Electric distribution naturally suggested itself, but the objections to high tension currents led to a consideration of compressed air as a means of power distribution. Dr. R Proell, well known in this country as the designer of the Proell governor, has worked out an elaborate scheme, and in a pamphlet published by himself and Messrs. O. L. Kummer & Co., of Dresden, gives very complete details, both in calculations and drawings, of a project for supplying 7,500 indicated horse power, and he expressed the opinion that a well designed and carefully arranged installation of this kind would compete in economy with an electric installation involving distribution by cables over long distances. A careful perusal of the pamphlet itself will probably enable the initiated to form a better opinion on this question, and we will confine ourselves to stating the general features of the scheme. Provision is made for the erection of ten triple-expansion condensing engines, working with an initial pressure of 150 pounds and twenty-fold expansion of steam, each engine to indicate 750 horse power. The cylinders are to be 18.9 in., 30.7 in. and 49.2 in. in diameter, and 49.2 in. stroke, working at 60 revolutions per minute, which gives a piston speed of 490 ft. per minute. The illustration shows the engines arranged horizontally; the flywheel shaft has two cranks, to one of which are connected the intermediate and high-pressure pistons, tandem fashion, and to the other the low-pressure piston and air pump, the latter placed vertically below the foundations. Coupled to the extended piston rods, in each case, is an air compressor. The steam consumption is estimated at from 12.1 pounds to 12.5 pounds per indicated horse power per hour. The air compressors have cylinders 27.5 in. in diameter and 49.2 in. stroke, same as the engines, and while the latter are, of course, controlled by the Proell valve gear of the latest pattern, the air compressors are fitted with mechanically controlled double-beat valves of the Riedler type. The cooling is effected by an external water jacket round the cylinder covers and valve chests, injection being objected to by the designer. The 20 compressor cylinders are calculated to produce 2,200,000 cubic feet of air of 120 pounds pressure per day, crediting the compressors with a coefficient of efficiency of 90 per cent. Steam is to be generated by 15 water-tube boilers of the "Durr" type, each having 2,200 square feet of heating surface; the fuel is to be lignite, fired into regenerators of the Schneider type, and with this arrangement the author expects to obtain an evaporation of 5 pounds of water per pound of lignite. An interesting automatic regulator is next described and illustrated, which has the object to adapt the air compression to the consumption. It consists of a pressure regulator operated upon by the air in the main, and altering the point of cut-off in the steam cylinder, thus either increasing or decreasing the speed of the engine until equilibrium is again established.

Probably the most novel features of the scheme consist in the motors, which it is intended to erect for the utilization of the compressed air. Heating the air during expansion and at the same time injecting a water spray, are the leading points. For medium powers of 4-horse power and upwards, the author proposes to use the "Doerfel-Proell" engine, of which a considerable number are already in regular use with steam, giving very economical results at from 200 to 300 revolutions. This motor is combined with a coil boiler, in which latter the compressed air is heated before it enters the motor, and during the heating process a small amount of water enters the coil from an overhead reservoir, while the exhaust air is used for accelerating the draught, thus establishing a self-regulating arrangement. For small powers of from ¼-horse power a new compound single-acting engine has been designed, somewhat of the pattern of the numerous box engines, the two cylinders being arranged on one center line vertically above each other, and the pistons attached to the same crank passing between the two. In these little motors a gas burner is provided under the bottom of low-pressure cylinder to heat the air as it expands in the latter. This heating is of considerable importance, and when completely carried out the author asserts that air motors can be worked as economically as any other method of power transmission, or producing steam power on a moderate scale. In large engines, however, such as would be necessary to supply electric light for a district, the air heating appliance would require considerable heating surface, and to obviate this combined gas and air engines on the plan of Mr. Fischinger have been designed by the author, in which the heat of the gas explosion is immediately utilized to warm the compressed air used as motive power in the air cylinder. The two cylinders are arranged horizontally, tandem fashion, the air cylinder near-

est the crankshaft. The compressed air enters the jacket of the gas cylinder, which latter is of the two cycle Benz type, cools this and enters the working cylinder ready heated. That all this has been most elaborately worked out in calculations, will be expected by all who know Dr. Proell, and anyone sufficiently interested in this scheme will do well to study the pamphlet in question, which moreover contains detailed calculations on the capital to be expended as well as working expenses.

Progress of Work on the Ferranti System, London.

The following interesting *resume* of the progress made on the Ferranti installation for the electric lighting supply of an important division of London, England, is taken from the *Electrical Engineer:*

Some miles of the Ferranti concentric mains that are to supply London on the high pressure system from Deptford are, as we have already informed our readers, now laid. All these mains as they are laid have to be very carefully tested, as the enormous pressure used may be expected to be far different in its action to any other that has yet been employed in practical working. To test underground mains which are to work at a normal pressure of 10,000 volts is a matter requiring no little care and discrimination, and it can be well believed that such a ticklish matter as turning on a current which itself is sufficient to send a ½-inch spark through air is one which does not come within the ken of many even of the most experienced of our present electrical engineers.

We have, therefore, thought that a description of the tests now being applied to the Ferranti mains will have an interest of a double value—first, as to the methods adopted for such an experiment in electric testing, and secondly, as to the results found and the differences experienced in dealing with such high potentials in long lengths of cable.

We must promise in the first place, that any one who expects delicate manipulation and elaborate mechanism either in the apparatus to be experimented upon or in the methods employed has but little understood the manner in which Mr. Ferranti has organized the lighting system from Deptford. We well remember asking Mr. Ferranti to explain the method upon which he tested the transformers and switches to be sent out for his high tension system and what instruments he used. "We couple two 10,000 volt transformers in series," he said, simply, "and connect up with the pressure of 20,000 volts. If there is anything left it is passed as good." The explanation, if a little off-hand, serves very well to indicate the kind of testing that has to be dealt with in the whole system. One other illustration will serve to indicate the way in which the problems as they arose have been tackled. A certain electrical engineer, himself well enough known both in cable and in alternate current work, remarked that one point over which Mr. Ferranti might be expected to experience great difficulty was the arrangement of the expansion joints, evidently figuring a complicated arrangement of sliding contacts. In reality the device adopted by the Ferranti system as expansion joints is nothing more complicated than one length of the main, bent by a rail bending machine into a long S form, the expansion serving slightly to increase the bend.

At the present time there is a total of 21 miles of the main laid and jointed along the route from Deptford to London. These are to form four parallel mains from Deptford. None of them are yet in one length, but are being connected together as fast as the curves across the railway bridges can be laid. The mains are laid mostly four in one trench, and the line is complete from the Charing Cross end to the Grosvenor in Bond street.

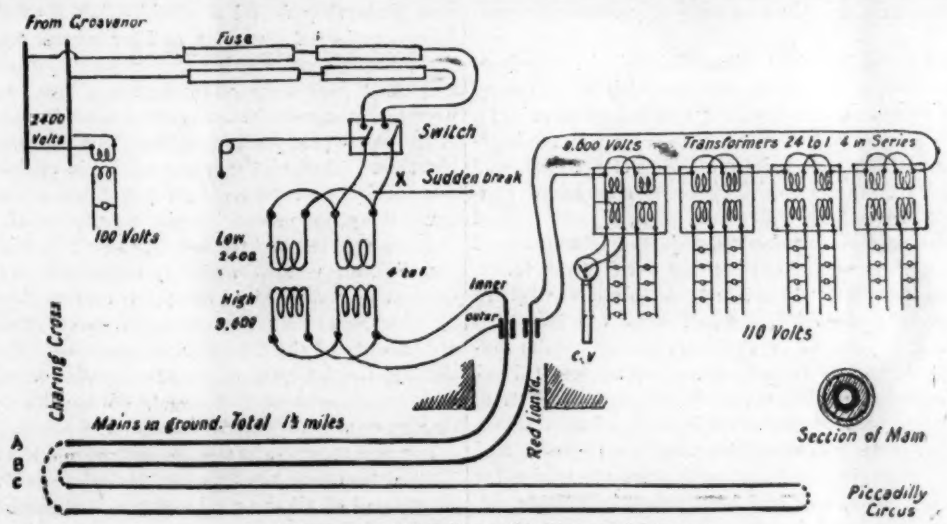
The London Electric Company have obtained a site in Red Lion yard, Cockspur street, and it is to this place that the ends of the cable are led, and here they have been tested day by day as the lengths are connected on. This station we have had, through the kindness of the Company's engineers, the opportunity of inspecting while the tests alluded to were being carried on, and these tests we now propose to describe.

In the first place all lengths of concentric main are tested as they come from manufacture at Deptford. It will be only necessary to say here that the mains each consist of two concentric lengths of thick copper tube run one inside the other, separated by a special insulation of waxed paper and protected on the outside by a steal sheath, also separated from the outer conductor by a thinner insulation. The mains are manufactured in 20 feet lengths, each main being coned or tapered down at the one end and similarly bored out at the other, so that they can be pressed together when slightly heated, and the joint becomes a solid mass. So much is this so that when occasion arises to break the joint the material often breaks clean across instead of separating along the coned surfaces. These 20 feet lengths are tested at Red Lion yard, ten being connected in parallel, with a pressure of 20,000 volts in the manner to be presently described, and it is a remarkable and noteworthy fact, as stated by the engineers, that although many hundreds of these lengths have been so tested, not a single one has yet broken down or any way failed.

The mains are next laid in the street. Trenches are dug, thin boards, well creosoted or pitched, are formed into a trough, and the mains, which are to some extent flexible, are laid therein, bitumen is poured over them, the top board is put on and then a layer of asphalt is poured on top of the board, thus forming a most efficient protection against injury by a pick or other tool, and then the earth is covered in. As each is laid and the joint is finished, the conductors are tested for continuity. It would be a little bewildering to one who knew somewhat but not quite enough about this testing to see 10,000 volt mains tested with a simple four volt cell and detector. The next test is that of outer conductor to sheathing. This is first done with an eight cell battery and a sensitive pivoted galvanometer to make sure of no accidental circuit. The work of laying then proceeds until the evening, or until such time as a high volt test is to be made. For this purpose the whole of the various mains are connected up in series so as to make simply one long length to be tested, the ends being already within the station at Red Lion yard. For the 10,000 volt test it is sufficient if at the further end the two adjacent cables be connected together—inner to inner and outer to outer—by two ordinary highly insulated cables laying along the trench in the roadway, and this method is adopted when the two cables have not both exactly the same length laid, and therefore do not finish quite at the same place. But for the 20,000 volt current to be put on requires both cables to be finished to the same point and connected across by a piece of the true Ferranti main, otherwise sparking or other effects occur on the cable along the trench. When properly connected the mains are first generally tested with a 100 volt current to make sure the insulation has no accidental small fault, and then the 10,000 volt current is turned on.

Here we must allude to a phenomenon which has not yet come beneath the notice of electrical engineers. If any electrical transformation occurs at ordinary pressures, the transformed current comes out at a pressure of the ratio of the transformer used, or, indeed, slightly less, due to loss in the transformer. Curiously enough—a matter of considerable importance to alternate current engineers—this is by no means always the case when the alternate current is of high pressure, that is, of the nature of 10,000 or 20,000 volts combined with a concentric cable. When a length of concentric main is connected thereto, it acts in the manner of a condenser, and a certain quantity of the current is required to charge the mains themselves, and the pressure on the mains in a long length seems to "pump up," as it were, and add together, so that the pressure on the other side of the transformer is far higher than the ratio would seem to indicate. Thus a transformation which would give 20,000 volts on a short length, if applied to a fairly long length of some miles, the pressure may rise to 25,000 or even 30,000 volts, and possibly to a far higher point. It was evident at an early stage that other effects than those generally experienced had to be dealt with, as in testing, if the length were long, the fuse which connects the main was found to give way at once with the sudden rush of current required to charge the conductor. For example, when the mains were laid to Blackfriars the four sets were connected all in series as before mentioned, and the 20,000 volt current was turned on. At once the fuse connecting them went. Another fuse was put in and again went, and so on, until the mains were disconnected, and one length only was connected when (the charge for the length being less) the fuse stood and no bad effect was observed. It has been found necessary, therefore, to always connect transformers at the further end and draw off some current—in other words, always to have some load on the main. This is necessary both on account of the precaution, and also as it is otherwise impossible to judge how far the pressure actually does rise in the mains. Even in this case, and when running some score or two of lamps the potential, which at the generating end would be normal (say 2,500 volts transformed up to 10,000), has shown up to 160 volts on the lamp circuit when transformed down again, instead of 100 volts, thus indicating the pressure in the charged length of main to be raised to $160 \times 24 \times 4 = 15{,}360$ volts, instead of the original 10,000 volts. This result is sufficiently remarkable, and will, no doubt, be the occasion of much speculation and observation by electrical engineers.

In practice the dynamo would be run slower, or the exciting current used would be less to obtain the 10,000 volt pressure desired. It is not yet definitely known whether this high pressure has the power of self-regulation to one uniform pressure in the whole main, or whether there is still a certain fall of pressure over a long length of main due to the ohmic resistance, as would, of course, have been expected were it not for the new conditions which obviously rule as shown in the rise in pressure we have described.



Progress of Work on the Ferranti System.

The diagram given herewith shows the method of connection for the testing of the mains when laid with the 10,000 volt pressure. The ordinary mains from the Grosvenor are led in at 2,400 volts. From these wires are taken, passing each through two long high pressure fuses, and then by a double pole switch to two 10,000 volt transformers connected in parallel. These transformers have a ratio of 4 to 1, so that the exact pressure on the terminals is 9,600 volts. The Ferranti mains end, as we have seen, in a cone, the inner conductor projecting forward. In the tests which we witnessed on August 30, the four lengths of underground main were previously connected in series as shown, so as to make one length of about 1½ miles, commencing at the testing station, going down to Brewer's Lane, Charing Cross, returning to Picadilly Circus, doubling back to Brewer's Lane, and so returning to the testing station at Red Lion yard. The wires at 9,600 volts were led to one end, and connected to the inner and outer conductors, so that the whole length had this pressure between its two concentric tubes. The circuit finished at the end of the second main at the testing station, and from there was led off to a discharging arrangement. This is shown in diagram in the figure, and consists of four sets of small transformers, ratio 24 to 1, connected two in parallel and the four sets in series, thus reducing the pressure again to $(9{,}600 \div 4 \times 24)$ a nominal 100 volts. The current was taken off each transformer separately by four 100-candle power lamps, or eight 50-candle power, as the case may be, each transformer thus giving 15 amperes, or each set of two 30 amperes. As the ratio of reduction is practically 1 to 100, the current in the 10,000 volt main was about 0.3 ampere only. When the current was turned on, as a matter of fact the lamps were considerably over incandesced, and the Cardew voltmeter which was connected to the lamp circuit indicated 110 volts. When only one set of transformers is attached to discharge the mains, the pressure has been seen to rise to 130 volts on the voltmeter, and with a longer length of main even to 160 volts.

The above is a statement of the arrangement for testing adopted on our visit. The current was kept on some minutes, and then the fuse went. This was owing to the fact that three strands of fuse only had been used to charge the mains for some time. New lengths of main had been added and this, as we have said, causes the rush of current to be greater as the length increases, due to the condenser action of the main, the greater current reappearing in increased electrical pressure. Four strands of fuse were inserted, and then the 10,000 volt current was kept for some quarter of an hour or so upon the 1½ miles of newly laid main.

The tests with 20,000 volt current were not taken at the time of our visit, but it is easy to see the arrangement adopted. The two first transformers in this case are connected in series instead of in parallel, as shown, and the discharging transformers are also connected all in series. This higher test cannot always be taken, as the mains must be closely connected, as already mentioned, with concentric main at the ends. The distance between the inner conductor and the copper sleeve projecting from the outer conductor is only ½ inch through air, and over this distance on damp days the 20,000 volt current will spark across with loud cracks like a pistol report. The highest potential is therefore not always employed, but the main has been repeatedly tested under this enormous pressure on many occasions.

After the main insulation has been tested, the insulation between outer conductor and the steel sheathing is tested in a similar way with transformers at a pressure of 500 volts, a discharging transformer being connected at the further end as before, the current in this case being absorbed by a metal resistance.

The work of laying the mains is now progressing rapidly. The four sets of main are practically complete to London Bridge; three sets are complete across the Charing Cross railway bridge. The mains are also laid as far as the Grosvenor Gallery. Some 13 gangs of men in all are working at them, and 21 jointing appliances are in use. During the week ending August 30, the Deptford station ran the whole of the load of 38,000 lights without any assistance from the Grosvenor, by the present temporary cables at 5,000 volts continuously without stopping from the Monday morning till the Saturday night. The opportunity has been taken to make some interesting experiments with the Grosvenor dynamos, such as running them in parallel and running them as motors from each other, and from Deptford. It is interesting to state that the Grosvenor dynamo has run as a motor, turning itself, and running the engine, with an expenditure of energy calculated from the current and pressure readings of 50 horse power. Since this date the two dynamos at Grosvenor have supplied the circuits in parallel.

The Proposed Municipal Electric Lighting Plant, Peabody, Mass.

The Boston *Herald*, in discussing this matter, prints the following interesting (if not in all respects trustworthy) compilation:

Probably nowhere are the traditions of the old New England conception of self-government, as practiced in towns, better preserved than in good old Essex county. In that mother land of the Massachusetts Bay colony the yeomanry preserves its sturdy spirit of independence. An Essex town still feels that when it wants to do a thing for the service of its people it has the right to go ahead and do it.

There are two towns in Essex which, by reason of their action upon this principle now have the eyes of the Commonwealth upon them. One of these is Danvers, the birthplace of old Israel Putnam; the home of Whittier, the poet of human freedom. Two years ago, when the people of Danvers decided that they wanted to have better lighted streets, they went ahead and put in their own electric light plant. So they get their lighting done, running their plant in the usual way on a "moon schedule" and burning their lamps till midnight at the cost of $47 a year a lamp. The result gives universal satisfaction; everybody is pleased with it.

Having these facilities, the people of Danvers very naturally wanted to gain the full advantage of them in the lighting of their houses and places of business. But the Legislature, exercising its paternal authority, would not allow them. That is, for two years in succession, the House of Representatives, being in touch with the people, said yes, by a very large majority. But the Senate, being in touch with the corporations, said no; it would be an interference with the sacred rights of "private enterprise," and if the people wanted such conveniences they must not think of serving themselves, but must pay tribute to those who are in it for what they can get out of it.

The New Englanders long ago, however, learned the lesson that paternal authority, when unjustly exerted, might be circumvented. When the British Parliament of the British Kings told the Puritan colony across the sea that they must not do so and so, it was the custom of Massachusetts to listen respectfully—and then go ahead and do it all

the same; and, if they could not do it in one way, they would find another way.

A typical New England town, bred in a school like this, is, therefore, not apt to sit patiently under any attempt to interfere with its privileges of self-government and substitute therefor the "step-paternalism" of a delegated government by private corporation. The same Yankee ingenuity that so easily got around the mandates of King George III, and his predecessors, and contrived to carry on the forbidden domestic manufactures and foreign commerce of New England, will, if possible, find some way for the town to thwart the intention of unjust interference with the principle of self-government and to do the thing that it wants to.

There is a homely old saying that "there is more than one way to skin a cat." It is upon this principle that the second of those two towns in old Essex has taken action. The town of Peabody, named for the eminent banker philanthropist who was born there, is a daughter of Danvers, and was formerly called South Danvers. It joins so closely on to Salem that it seems a continuous part of the ancient city of the witches. The example of the mother town was contagious, but, as Danvers had asked for the privilege of supplying its inhabitants with electricity for private use from its public supply, and had been refused, Peabody decided not to ask, but to go ahead and do it!

"Although the General Court has refused to tell us that we can, it has, nevertheless, not told us that we cannot!" was the idea that prompted its action. Silence, of course, gives consent. And so it was decided to establish an electric plant for lighting, and to sell the surplus electricity to private consumers.

The steps that led to this decision are interesting, as well as important, since this case is to furnish a test, and bids fair to establish a precedent.

Peabody, though a large town of something like 10,000 inhabitants, is, as yet, without electric lighting, with the exception of two arc lamps in the square, near the railway station, supplied by the Salem Company. For these two lamps the town has been paying $200 a year. The question of generally introducing electric lights has been agitated for some time, and some months ago a few residents got together and organized a company. It would be a most profitable undertaking, they said; the franchise would be a valuable one, and they would not get it for nothing; they would charge the town roundly for the service, and so would make a very handsome thing out of it. So a town meeting was called and the promoters of the scheme endeavored, by resorting to the well-known tactics of packing the meeting, to get its adoption rushed through in a hurry. But a number of those sturdy citizens who, by their vigilant public spirit maintain in every live New England town the principle of town government in its vital integrity, got wind of the project and secured its defeat.

It seems that much public irritation had been caused some time before by the action of the selectmen in giving away a franchise for an electric railway to Salem. This road was surperfluous since the accommodations afforded by the Naumkeag railway were sufficient. It was a valuable franchise, however, and the town got nothing for it. The selectmen were severely criticised for what they did, and it was openly charged that the influences governing their action were not what were proper to guardians of the public welfare. Not only was the electric light company's project defeated by the citizens in the town meeting assembled, but the selectmen were instructed not to grant any more franchises whatever. Then it was tauntingly asserted that the town did not want any electric lighting whatever, and that Peabody was a slow-going, unprogressive place, not alive to the value of modern improvements. This, however, was not the idea of those leading citizens who had brought about the defeat of the private project. But they thought that if there was any profit to be made out of electric lighting, it should go to the public, rather than into the pockets of a few individuals.

So another town meeting was called, and an able committee was appointed to investigate the subject of establishing a public electric light plant. The committee consisted of Herbert P. Reed, John Osborne, Albert E. Southwick, Charles C. Dodge and Charles C. Haven. The committee's report is a model of careful, conscientious work.

Of this work one of the local newspapers said: "Never in the history of any town has there been so faithful, energetic and self-sacrificing a committee as the electric light committee of the town of Peabody. Of the $250 voted to them for expenses they used but $90, and half of this went for maps that the town needed and must have had. They have been so scrupulously conscious of any adverse criticism that they have in several instances paid their own railroad fares. They have spent days, and undoubtedly have neglected their business, that the town might be benefited."

In the course of its investigations the committee learned many valuable facts concerning electric lighting and the supply of plants. In the first place they found a combination controlling several of the well known makes of dynamos, and for several good reasons were led to believe that the combination was opposed to a town plant, even of its own system. "Plants owned by municipalities," said the committee, "must necessarily expose the true cost of electric lighting, and the comparison of the prices paid the corporations works to the disadvantage of the combination." Among the reasons for this opposition of the combination was the fact that the great companies manufacturing electric plants, as a usual thing, take a considerable proportion of their pay in stock of the local companies, and the low cost at which municipalities would do their own lighting would inevitably necessitate a reduction of rates by the companies which would be apt to reduce the earnings of their stock. Another reason was that one great manufacturing company had almost a monopoly of the field in New England. The entering of municipalities into the business of electric lighting would again throw the field open to competitors, and largely reduce the prices of plants on which they were now earning so handsome a profit.

The bids received by the committee from the concerns belonging to the combination were nearly alike, and of such high figures that, had they the control of all the good systems, it was believed that there would be no chance for the town to buy a plant at a figure it could afford to pay. But other good systems were found still outside the combination, and one of these, from a responsible company, whose bid was the lowest, was selected.

In considering the endeavors of the combination to defeat the adoption of a town plant, the committee said that, should a private company build the plant, the town would not only have to pay for the construction and running expenses, but also pay large dividends, as is now done in Salem and other places. It was found in the Gas Commissioner's report, issued this year, that the Salem Company paid a dividend of 21 per cent., amounting to $25,200 the past year.

It was found that electric lighting companies had various ways of adding to their profits. Although contracts with companies usually provide for lights of 2,000-candle power, nowhere near that intensity is continuously maintained. For instance, on moonlight nights, the power can easily be reduced one-half without the loss of light being noticed. Where lights are burned after midnight, it can also be greatly reduced. This reduction of current, of course, means less coal, and the saving goes to the company. Should the town own the plant, it would pay only for such current as it used.

Peabody has an excellent system of water works, supplying its inhabitants at remarkably low rates, which bring in such good returns that the town not only has its works nearly paid for, but it gets its water for fire purposes and other public uses free of cost, and makes a handsome annual profit besides. In view of this fact, the committee pointed out that it might light its streets at small cost when it shall sell its citizens light, as it does water.

The committee reported that, from a very careful estimate, and the guarantees given to run 110 lights of 1,200-candle power, burning all night every night except five in each month at the period of full moon, would cost $7,000 a year, making the cost $63.63 a lamp for the year, or 21.2 cents a night. By running the dynamos to their full capacity the cost would be made much less.

By selling the surplus electricity the dynamos could be run to their full capacity, and therefore, in accordance with the recommendations of the committee, the town voted to appropriate $30,000 for the plant, with $2,500 for running expenses, and that the town sell for commercial purposes any surplus lighting power it might have. The citizens were so enthusiastic for the proposed action that they voted with practical unanimity in its favor at the town meeting called for the purpose, only one negative vote having been given, from a citizen who afterward declared that he only voted "no" in fun.

Just as the action was to be carried into effect, however, a temporary injunction was served, forbidding anything to be done until the question had been decided by the Supreme Court. This step was sought by a resident, who induced a few others to sign the necessary paper, ostensibly in behalf of taxpayers, but it is pretty well known that the real motive is supplied by a powerful corporation that, for the reasons previously stated, is opposed to town plants, and is determined to use every possible means to defeat that end.

The ground alleged for bringing the injunction is that a town has no right to do any lighting. The question comes up before Judge Holmes, of the Supreme Court at Salem, this month; but whatever way it is decided at this preliminary hearing, it will naturally be appealed to the full bench, which meets some time in November. Its decision then will probably definitely settle a very important question. Able counsel have been engaged by both sides, and Peabody will be represented by Mr. L.

S. Dabney, of Boston, and Mr. Forrest L. Evans, who is the City Solicitor of Salem, and others.

The citizens of Peabody manifest a deep interest in the matter, and there is a universal feeling of confidence, grounded on the evident justness of their case, that the decision will be in favor of the town. "Why, then, was there not an injunction brought against Danvers two years ago?" was asked of leading citizens.

"Probably because nobody could be found in the town mean enough to ask for it," was the reply.

"As to the question of the right of the town to sell the surplus electricity for commercial purposes," said another, "there ought to be no doubt of that, for towns have always been in the habit of selling their surplus product of any kind. Here we have an almshouse and poor farm, for instance. If there are any surplus potatoes or onions or cabbages beyond what are needed for the wants of the institution, they are sold, and the receipts make the expenses of running the establishment so much less, and, therefore, the taxes so much lower. If these things could not be sold, owing to some legal technicalities, but were compelled to lie and rot, then the cost of running the almshouse would be higher by so much, and taxes correspondingly increased. Here we have a handsome town hall, not only for public meetings, but for the convenience and pleasure of the people, fitted up particularly for amusement purposes, with a stage and scenery, provided by the town, for theatrical performances. The hall is let whenever wanted, and a revenue is received from that source. That corresponds to a surplus product from public property. Perhaps those who want us to pay private parties a large sum for our electric lighting would say that the town ought to depend upon private enterprise for accommodation for its public meetings, and 'hire a hall.' Then if any person in town wants to hire a steam fire engine to do some pumping—a flooded cellar or clay pit, for instance—he can do it, and the town gets a revenue from that. So it is with any of the town property, when it is not in use, or any surplus product of town property. The fact that the doing of these things by the town might bring it into competition with private individuals, and deprive them of the opportunity to get a higher price for their products or their services, does not count against the town's right to do them for the benefit of its citizens.

"So with the surplus product of our electric light plant. By selling it we can get our own public lighting cheaper. And the more surplus electricity we have, the more we can sell and the greater will be the revenue, making the cost of public lighting correspondingly less. By running the plant in the daytime also we could supply electricity for motive power at cheaper rates than a private corporation would do, and so, while getting an additional source of revenue by doubling the use of plant, we might benefit the town materially in another way by making it worth while for new industries to locate here for the sake of a motive power so convenient and cheap."

"Have you ever heard about that Lowell market house decision by Chief Justice Shaw?" was asked.

"Yes; I have read about it with great interest. It seems to establish an important precedent in our favor. Just as it was decided that it made no difference if the market house was larger than was needed for market purposes, so long as its main object was that of a market house—its size and the use to which the remaining portion was put being a matter lying within the discretion of the municipal authorities—so, as the *Herald* put it a few weeks ago, it should make no difference what the town of Peabody should do with the surplus electricity produced by its lighting plant, so long as its main purpose was that of public use.

"Therefore, from this it appears to me that, should we have such a demand for electricity from private consumers, for lighting and other purposes, as to exceed the capacity of our plant, the citizens could vote to enlarge the plant, and so meet the demand. It would still be a surplus product, for the main purpose of the plant would still be that of public lighting, just as the main purpose of the building at Lowell was that of a market house. It would make no difference how large that surplus might be. The larger it was made the more we would get for it, and the less the cost of our public lighting would be, correspondingly reducing the amount of taxation necessary. Ultimately it might be possible to get our public lighting for nothing, while private consumers would get the benefit of cheaper light than they could get from a private corporation."

"We propose to run the electric plant on business principles," said a member of the committee. "The plant will be installed in first-class shape, and then a competent electrician will be engaged and put in charge of it, to be run as he knows how to run. There will be no politics whatever about the thing. The pretence of electric light companies that they can give better and cheaper service than is possible to a town is absurd. They can do it with no greater economy of running expense than we can, and where they have to charge rates high enough to give them good dividends on a large capitalization—perhaps watered stock—the town gets its lights from its own plant at cost."

There was found among the citizens a universal feeling of confidence that the decision of the Supreme Court would be given in favor of the town.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. P. J. Plattner, who gained both fame and friends through his able management of the interests of the Houston (Texas) Electric Light and Power Company, has accepted a position with the Brush Electric Light Company, of Galveston.

Early last spring the proprietors of the Fort Worth (Texas) Light and Power Company decided to remodel their electric lighting plant, the first step being to replace three Taylor high-speed engines by a 350-horse power Hamilton-Corliss engine. The equipment also included 100 feet of line shafting, with independent clutch pulleys for each dynamo. The Company is now operating a 2,500-light incandescent service, from Westinghouse machines; also, 90 high candle power arcs. Better news than the foregoing, however, is found in the fact that the Company is completing a new 12-inch gas works, which Supt. Lord hoped to have in active running not later than Nov. 1st. The retort house is 120 feet by 40 feet; exhauster and condensing room, 25 feet by 40 feet; purifying room, 40 feet square; meter room and office, 25 feet by 30 feet. The carbonizing equipment consists of 4 full regenerative benches, 8 retorts each, of the Kloenne-Bredel type: an exhauster of the Roots rotary type, with Pelouze & Audouin condenser on same bedplate; multitubular condenser and Mitchell scrubber, together with a set of purifiers 12 feet by 14 feet, by 4 feet deep, with hydraulic apparatus for raising covers and self-sealing dumps for emptying boxes, all fitted with the latest improvements in valve connections, show that the plant after the retort house is equal to that in the latter in respect to modern practice. The plant is fully up to the manufacture and distribution of 350,000 cubic feet per diem, and reflects great credit upon the contractors—the Bouton Foundry Company, of Chicago—whose reputation for first-class work is of the certain sort. Superintendent Lord must also come in for a share of praise for his careful direction of the affair, and we must congratulate him on the fact that he will soon be in command—or actual possession, rather—of one of the best equipped gas plants southwest of St. Louis. The Bouton Foundry Company took the contract complete.

We are indebted to Mr. A. R. Allison for the following interesting matter respecting the termination of the suit of Bohan vs. The Port Jervis (N. Y.) Gas Light Company: "The decision in the action of Margaret Bohan against the Port Jervis Gas Light Company, reported by telegraph about a fortnight ago, from the Court of Appeals, is of importance to the Gas Company and to those who own property either contiguous to or adjoining its works. For this reason the action has been stubbornly contested through all the State courts, finally to result in a decision in favor of Mrs. Bohan. A brief history of the case will no doubt be of interest to your readers. The action was brought about on April 1, 1885, to recover damages for injuries to plaintiff's premises by reason of noxious and offensive odors emitted from the gas works, and for a perpetual injunction restraining the Gas Company from so operating its works as to cause the emission of such odors. The Company claimed exemption from liability because of its charter, which empowered it to make gas, and, further, because no negligence could be charged in its system of gas making. The case was tried before Judge Cullen and a jury, at Goshen, in June, 1886. The trial was a prolonged one, and much expert testimony from owners and operators of gas works in other cities and towns was given. The plaintiff's right to damages was limited simply to what rent she had lost from the years 1880 or 1881 up to the time the action was brought in March, 1885. The jury eventually assessed these damages at $340, and judgment for $486 (damages and costs) was entered. As soon as that verdict was rendered, Mr. Lyon, of plaintiff's counsel, moved for a permanent injunction, which was then and there granted by Judge Cullen; and as this injunction, if sustained, meant great damage to the Gas Company, an appeal from such judgment and injunction order was taken to the General Term of the Supreme Court, where the same were affirmed; when a further appeal to the ultimate legal tribunal (the Court of Appeals) was taken. The case was not reached for argument in that Court until March of the present year, and it was stubbornly and persistently contested. Although hundreds of cases have been argued and passed upon

since in that Court, the decision in the gas case was not handed down until the 7th inst., which sustains plaintiff completely in her contention. What the outcome will be I am not prepared to say, but it is a certainty that these proceedings have been watched with great interest by every Gas Company in the State, even though the proceedings emanated from a place no larger than Port Jervis. Mr. John W. Lyon handled the plaintiff's case, while Mr. Lewis C. Carr represented the Gas Company."

THE offices of the Woburn (Mass.) Gas Light Company have been removed to comfortable quarters in what is known as the "Savings Bank Block."

THE Quincy (Mass.) Gas Light and Coke Company has placed a mortgage of $150,000 for the purpose of paying for extending and improving its plant. The bonds are to bear 6 per cent. interest, and are to mature in 1910.

SUPERVISOR ELLERT'S order for the quarterly inspection of gas fixtures in hotels and lodging houses of San Francisco does not appear to have much terror for the proprietors of those places. Up to Oct. 5th, 692 hotels and lodging house keepers had been notified of the passage of the order, and but 8 have responded in compliance with the regulations. The 90 days allowed for the filing of certificates of inspection will shortly expire, whereupon Gas Inspector Brown will appeal to the Courts for writs against the bodies of the delinquents.

SPECIAL despatches, dated Trenton, N. J., Oct. 8, are to the effect that it is possible that the law passed by the New Jersey Legislature in 1889, for the taxation of corporations other than railroads, will shortly come before the United States Supreme Court, in a matter of a constitutional test of the validity of the act. The question is now before Judge Green, of the United States Circuit Court, and was raised in the suit brought by the Jersey City Gas Light Company against the United Gas Improvement Company. The suit is brought to recover certain taxes which the plaintiff paid the State of New Jersey, but which, it is claimed, should have been paid by the defendant. In 1884 the Jersey City Gas Light Company's works were leased to the United Gas Improvement Company for a term of 20 years, at an annual rental of $77,000, and the payment of all assessments and taxes which may be lawfully assessed or levied upon the real and personal property, franchises, capital stock, or gross receipts of the plaintiff. Under the law of 1884 gas and electric light companies are taxed at the rate of one-half of 1 per cent. upon the gross amount of their receipts, and 5 per cent. upon the dividends of the companies, in excess of 4 per centum. The tax imposed on the Jersey City Gas Company under this act amounted to $2,635, of which $385 was taxed on gross receipts and $2,250 on excess dividends. The United Gas Improvement Company paid the $385 on gross receipts, but the balance ($2,250) remained unpaid, wherefore the Court is now asked to pass upon the liability of the defendant for this amount. The testimony produced before the Court consisted of documents from the office of the State Board of Assessors, the State Comptroller, and the State Treasurer, to show the assessment of the tax against the Jersey City Gas Light Company, and the payment by that Company. Gov. Beadle, who represented the United Gas Improvement Company, objected to the returns of the State Board of Assessors on the ground that they show no lawful assessment within the scope of the contract, and made other objections which will bring into question the constitutionality of the method of taxation laid down in the act. The Attorney-General of the State appeared in court and asked permission to submit a brief on the ground that the interest of the State was involved. The case will be concluded and argued on the 30th inst. Messrs. Wallis & Edwards represent the plaintiff.

STILL another suit is that instituted about a fortnight ago, in the Common Pleas Court, of Louisville, Ky., by Michael Finnegan against the Louisville Gas Company. In his complaint Finnegan states that, on October 4, 1889, he was employed by defendant to put coal on an elevator provided for that purpose, but through the gross negligence of the defendant, its agents and employees, he sustained painful and dangerous injuries. An employee whose duty it was to control the elevator was so careless in the performance of his duties that the plaintiff was injured by an accident resulting therefrom, and that he has been unable to earn a livelihood since on account of said injuries, wherefore he prays that defendants be ordered to pay him $10,000.

AT Concord, N. H., on the 8th inst., in the United States Circuit Court for the district, the case of the United Gas Improvement Company vs. the Manchester (N. H.) Gas Light Company, was settled through the payment of $1,500 to complainant by defendant. As our readers will likely remember, this ends an action brought upon an alleged contract entered into in 1887, by Mr. A. O. Granger, an agent of the plaintiff company, for the sale of a water gas plant to defendant. The Directors of the defendant company denied that there was a contract, hence the suit.

WE understand that the City Council of Boone, Iowa, has granted a franchise to the promoters of a Fuel Gas Company, who agree to supply gas at a figure not in excess of 60 cents per 1,000 cubic fest. The organizers are said to be J. G. Shattuck, of Chicago, and W. H. Harris, of Boston. The Company, under the ordinance, must accept the franchise in 10 days, and begin substantial work in 30 days. The promoters claim that $25,000 will cover the necessary expenditure on plant account, and that they mean business. It is safe to say, however, that the Boone fuel gas works will not become a brick, stone and iron reality for some time to come.

WILLIAM HAZZARD, employed at the Vicksburg (Miss.) Gas Company's works, was severely burned about a fortnight ago.

ANOTHER victim to improperly insulated electric light wires is reported from New Orleans. A local account of the horrible affair is appended: "Joseph Clements, aged 21, a tinsmith in the employ of James P. Brady, and his 'boss,' were making ready to repair the tin roof of the 3-story brick building at the corner of Gravier street and Camp. Mr. Brady, noticing that the roof was very dirty, told Clements to sweep it off. Clements got a broom and began the task intrusted to him. Having cleaned off the Camp street side of the roof, he directed his attention to the Gravier street side, being obliged, however, to cross a network of wires to reach that section. The insulation of one of the wires was faulty, perhaps a foot of the metal being exposed. Clements, on arising from the stooping posture he was in while sweeping, brought the back of his neck against the wire, and instantly reeled, only to fall on his face a corpse. Mr. Brady ran to his assistance, but found the unfortunate quite dead. Clements did not utter a sound while falling."

COMMENDATION by the local papers of their respective Gas Companies is something so rare that we always hasten to place such odd matter before our readers. This is the latest excerpt in that line which we can give, and it is taken from the columns of the Amesbury (Mass.) *News*: "Amesbury has a Gas Company that gives better service for a reasonable rate than any other concern in New England. For quality of illumination and steadiness we have yet to see its product excelled. Our office is lighted by this means, and there is no better lighted printing office anywhere in this section." What do you think of that?

MR. S. CALVERT FORD, Inspector of Gas and Meters for the District of Columbia, has submitted his annual report to the Secretary of the Interior. We extract the following: Washington Gas Company, average illuminating power, 18 candles; highest, 21.01; lowest, 16.02; average quantity of ammonia in 100 cubic feet of gas, 1.97 grains; highest quantity of ammonia, 4 96; lowest, 1.17; average amount of sulphur, 11.77 grains; highest amount, 17.33; lowest, 4.12. Georgetown Gas Company, average illuminating power, 17.03 candles; highest, 19.94; lowest, 13.28; average amount of ammonia in 100 cubic feet of gas, 2.09 grains; highest quantity, 7.52; lowest, .45; average amount of sulphur, 13.33 grains; highest, 24.63; lowest, 6.62. On 6 occasions the gas supplied by the Washington Gas Company contained more sulphur than the 24 grains allowed. The average pressure of gas supplied by the Company, as recorded in the Inspector's office, was 1.20 inches. The highest pressure was 2.10 inches, and the lowest pressure, .78 inches. On 10 occasions the illuminating power of the gas supplied by the Georgetown Gas Company was less than 16 candles. On 4 occasions the quantity of ammonia found exceeded the 5 grains allowed. On 4 occasions the quantity of sulphur found exceeded the 24 grains allowed. The average pressure of gas supplied by this Company was 1.54 inches, the highest pressure 4.77 inches, and the lowest pressure, .86 inches. During the year 1,283 meters were inspected and proved. With the exception of 7 these were all inspected either on Gas Company or gas consumer's account. The result of the inspection was: 76 registered fast—average, 4.01 per cent.; 43 registered slow—average, 6.43 per cent.; 1,163 registered within the limit allowed—2 per cent. either way—and 1 did not register at all. The report says that the gas supplied by the Washington Company during the year was of higher illuminating power than during any year since the inspections have been authorized. Mr. Ford also says that the gas supplied by the Georgetown Company was more uniform in illuminating power and purity than for the period ended June

30, 1889. The consumption of gas in Georgetown is steadily increasing, and the Inspector is of the opinion that it will soon be necessary for the Company to lay larger mains on the principal thoroughfares. He renews the recommendation for the establishment of a branch office near the new gas works in Southeast Washington, and also repeats the recommendation in respect to the appointment of an Assistant Inspector.

THE executors of the Smith estate have sold a half interest in the Cuba (N. Y.) Gas Company to the Messrs. Bradley, of Bolivar, N. Y.

RICHARD ENRIGHT, who for the past 25 years has been in the employ of the Utica (N. Y.) Gas Company, died at his home, in Utica, on the morning of the 10th inst.

MARION, Pa., is to have a gas works. M. C. Watson and others are interested in the venture. Something like $50,000 will be put into the plant.

ACCORDING to the choice of the proprietors, the following officers have been chosen to manage the consolidated gas and electric light interests of Jeffersonville, Ind.: President, C. E. Eaken; Secretary and Treasurer, A. A. Swartz; Directors, Ed. Weber, Simon S. Goldbach and Dr. E. C. Taggart.

THE residents of West Philadelphia are complaining that the quality of the gas supplied them is far below what it should be, but the reports as to candle power—which are furnished daily, except Sunday, by Prof. Stevens, at Girard College, and by Prof. Cresson—show this charge to be unfounded. An average of the tests for the first 12 days of October shows the candle power to have been 22.40. The real trouble at Philadelphia is the insufficiency of the main system as to pipe diameters.

COL. JEROME CROUL, of the Detroit (Mich.) Gas Light Company, in company with Superintendent I. C. Baxter, were in the city recently, en route to the Savannah convention. Apart from the fact that the Colonel's Company has one of the model works in the States—a condition of things largely brought about by his energy—he is also to be congratulated on having developed Detroit's magnificently equipped and managed City Fire Department, as it was during his incumbency of the Presidency of the Detroit Board of Fire Commissioners that the development was made. By-the-way, Baxter seems to grow younger despite the passing of the years.

THE sub-committee of the Fire and Light Committee of Toronto Councils have determined to recommend the acceptance of the Gas Company's proposition to furnish and maintain 1,000 gas lights in the streets, the Toronto Electric Light Company to be awarded 800 arcs.

COUNCILMAN HUMPHREY, of Kansas City, Mo., has completed his estimate of the cost of installing a municipal electric lighting plant, and finds that to maintain 400 arcs, and 3,000 incandescents the city would have to invest $259,750.

THE WACO (Texas) Gas Company, which also controls the electric lighting supply, is about to place a 100-foot steel tower, to carry 4 alternating current lamps, of 1,000 candles each, on the highest point in the suburbs known as Grimes' Addition, the latter having recently been purchased by Mr. H. C. Scott (and others) of the Gas Company for the sum of $120,000.

AT the annual meeting of the Troy (N. Y.) Gas Company the following Trustees were elected: Edward Murphy, Jr., Wm. Kemp, F. E. Draper, Joseph Fales, James Fleming, S. O. Gleason, Geo. P. Ide, F. J. Molloy, Wm. A. Thompson, A. Bleecker Banks, A. N. Brady, R. C. Pruyn and Thos. Breslin.

THE increase in the use of gas in this city is beyond the estimates of the most sanguine.

THE Toronto *Daily News*, in an editorial discussing the public lighting of that city, uses the following sensible language:

The committee having the street lighting contract under consideration should not come to a hasty conclusion, but should judge the matter in all its bearings. The Electric Light Company has given the city good service so far as it has gone, but so has the Gas Company, and the former should not be favored at the expense of the other, as seems to be the tendency just now. The relative merits of gas and electricity are not under consideration, but the question is, is it expedient to supersede gas by electricity in residential streets when gas is just as serviceable and cheaper? For the business streets the electric light is the proper thing, as the streets are unobstructed by trees and the illuminating power of the light is not impaired, but in residential streets lined with trees, as most of the streets in Toronto are, gas is much more preferable and gives much better service, as the electric lights are swung 35 feet high, usually at street corners, and as their light cannot penetrate the trees the sidewalks are usually in darkness; but with gas lamps, only about 8 feet high, the sidewalks are fully illuminated for some distance on either side. At present the Company has its lamps 200 feet apart in many places, and it uses a burner which consumes 3½ feet of gas an hour. Its latest proposition contained in its tender, and impressed upon the committee by Mr. Pearson, is to place its lamps 150 feet apart and to use a burner which consumes 5 feet an hour, which would furnish an excellent light, as any one with knowledge of gas lighting will admit. Mr. McGowan has reported to the committee that an electric light would supplant 6 gas lamps, but with them disposed 150 feet apart and using a 5 feet an hour burner, it would not supplant 2 lamps in illuminating power, especially when it is proposed to put the electric light 200 yards apart. Four such gas lamps can be furnished for $80 per annum, while each electric light will cost $108.60 per annum. While there may be a demand down town in the leading business thoroughfares for the brightest lights which can be got, there is no such demand in residential streets, where the glare of the electric light is not agreeable. It would not be pleasant to have daylight all the time, and that is what the electric light companies aim at in furnishing the very brightest light which can be produced. But of what use is an electric light in a residential street which is already supplied with gas? It is a matter of indifference to the people what kind of a light is outside after they have retired, but it is a consideration in the business district, where the streets are in use more or less all night. The police, doubtless, appreciate a bright light, but good lamps 150 feet apart would be a better protection than electric lights 600 feet apart.

To do away with 2,500 gas lamps would injure the Gas Company very much, Mr. Pearson says. In the past the Company went to great expense in laying mains to furnish street lights where it would not secure a single private consumer, and it is estimated that it has laid over 50 miles of mains for this purpose alone. All the money and labor which this has cost will be lost to it if the lamps are put out now, and in consequence it will have to write off from $30,000 to $35,000. It may be said that the Gas Company is not entitled to any consideration, but if it is willing to furnish the city with gas at about 50 cents a 1,000 feet for street lighting purposes, while the charge of the Electric Light Company for the same service is much higher, its offer is deserving of all the consideration which can be given it in the interest of the citizens. Sentiment should not enter into the matter. A large sum is being asked by the Electric Light Company for its service, while the Gas Company is prepared to furnish as efficient a light for nearly one-half the cost. A few electric light supporters in the Council say the Gas Company has not been liberal to us in the past; therefore let us reject its liberal offer now and give the contract to the Electric Light Company, although it may cost more money. But these gentlemen must remember that it is the citizens' money they are dealing with, not their own, and the citizens do not want prejudice but business principles to rule.

If the committee put out 2,500 lamps it will affect 100 families, the heads of which are in the employ of the Gas Company in its different departments. The extension of the electric light will not furnish employment to one quarter that number. Would the Council be justified in depriving so many men of employment merely to benefit a Company which in time will grow into a monopoly just as eager to advance its interests as the Gas Company is? Would it not be better to deal with the monopoly the Council knows and can in a measure control, than to give a 5-years' contract to a monopoly which is not known, and deprive a hundred men of their means of livelihood? The city has had no concessions from the Electric Light Company that it should favor it in any particular; and the 5-years' contract should be made with the company offering the most for the money. We think that the tender of the Gas Company offers the most, as it will not require nearly such a large sum to deal with it as it would to deal with the Electric Light Company. Besides, the limits of the Gas Company's tender are known, while it is not known where the electric light extravagance will stop. It is proposed to increase the number now in use by 390, but this does not imply that the additions will stop there. Being plentiful, every alderman will be importuned for lights, and there will be no economy practiced when voters have to be satisfied by granting their requests. The citizens, and particularly workingmen, should watch this committee closely. If it gives the contract to the Electric Light Company, and drives upwards of a hundred employees of the Gas Company to the wall, and at the same time increases greatly the cost of lighting to the citizens, it will do a wrong for which it should be remembered.

The Market for Gas Securities.

The market for city gas shares showed considerable improvement during the week, Consolidated moving up sharply towards the close. Opening sales to-day (Friday) were made at 100⅝, the price advancing to ¾ and ⅞, with 100⅞ bid at noon. The stock is bound to go to the figures named by us some time ago (107 or better) as likely to be recorded before the Christmas holidays. In fact we would not be surprised to see 110 made in it before that time. Our advice all along has been to buy it, and we say buy it now—not for speculation but for investment. Other city shares are stronger, notably Mutual, although no transfers in it have been recorded lately. Equitable more than holds its own. Brooklyn shares are about as before, but the undertone is stronger than for the past fortnight. Bay State gas is somewhat higher, and Laclede, both as to common and preferred, is dull and weak. Chicago gas is back to 44½–45, and offers a fair opportunity for profit. The market seems to be all in favor of holders.

Gas Stocks.

Quotations by Geo. W. Close, Broke. and Dealer in Gas Stocks,

16 Wall St., New York City.

October 20.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	100⅞	101
Central	500,000	50	90	100
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	124	126
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	—
Mutual	3,500,000	100	120	—
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	40	45
Preferred	5,000,000	100	85	90
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	119	122
Citizens	1,200,000	20	94½	95
" S. F. Bonds	320,000	1000	100	103
Fulton Municipal	3,000,000	100	134	—
" Bonds	300,000		100	105
Peoples	1,000,000	10	—	95
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	108	110
Nassau	1,000,000	25	133	—
" Ctfs	700,000	1000	100	102
Williamsburgh	1,000,000	50	129	132
" Bonds	1,000,000	—	108	112
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	93	93½
2d " " "	3,000,000	1000	71	72
Bay State Gas Co.—				
Stock	5,000,000	50	70	74
Income Bonds	2,000,000	1000	95½	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds	45,000	—	—	—
Chicago Gas Company	25,000,000	100	44½	—
Chicago Gas Light & Coke Co.—				
G't'd Gold Bonds	7,650,000	100(	—	92½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	98
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	100
2d "	2,500,000	1000	94	98½
Consumers Gas Light Co., Jersey City	2,000,000	100	—	30
Bonds	600,000	1000	80	—
Cincinnati G. & C. Co.	6,000,000	100	201	203
Consumers Toronto	1,000,000	50	190	200
Central, S. F., Cal.			80	90
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	49	49½
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	110
Bonds	250,000		—	—
Hartford, Conn.	750,000	25	102	108
Jersey City	750,000	20	170	175
Louisville, Ky.	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	15¼	19
Preferred "	2,500,000	100	—	55
Bonds	9,034,400	1000	78	78½
Montreal, Canada	2,000,000	100	200	208
Memphis (Tenn.) Gas	750,000	100	40	—
" Bonds.	240,000	100	103	—
New Haven, Conn.		25	200	—
Oakland, Cal.			35	36
Peoples, Jersey City		—	60	61
" " Bonds			—	—
Paterson, N. J.		25	99	102
Rochester, N. Y.		50	99	100
Syracuse, N. Y.	500,000	25	—	—
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	59	59½
Washington, D. C.	2,000,000	20	200	208
Wilmington, Del.		50	88	90

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City 565
Wm. Henry White, New York City 571
Wm. Mooney, New York City 565
Fred. Bredel, N. Y. City 567

CHEMISTS.

Durand Woodman, New York City 555

GAS AND WATER PIPES.

Gloucester Iron Works, Phila., Pa 565
Mellert Foundry and Machine Co., Reading, Pa. (John Fox, Selling Agent, N. Y.) 565
Ohio Pipe Co., Columbus, Ohio 565
M. J. Drummond, New York City 565
R. D. Wood & Co., Phila., Pa 570
Warren Foundry & Machine Co., New York City 565
Donaldson Iron Co., Emaus, Pa 565
Dennis Long & Company, Louisville, Ky 565
Spiral Weld Tube Company, New York City 565

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City 571
Continental Iron Works, Greenpoint, L. I 571
Delly & Fowler, Phila., Pa 571
Kerr Murray Mfg. Co., Fort Wayne, Ind 568
Stacey Mfg. Co., Cincinnati, Ohio 571
Bartlett, Hayward & Co., Baltimore, Md 569
Morris, Tasker & Co., Limited, Phila., Pa 569
Davis & Farnum Mfg. Co., Waltham, Mass 568
R. D. Wood & Co., Phila., Pa 570
Bouton Foundry Co., Chicago, Ills 571
Isbell-Porter Company, New York City 570
Fred. Bredel, N. Y. City 567
United Gas Improvement Co., Phila., Pa 561
National Gas Light and Fuel Co., Chicago, Ills 562
Berlin Iron Bridge Company, East Berlin, Conn 488

PROCESSES.

National Gas Light and Fuel Co., Chicago, Ills 562
Bartlett, Hayward & Co., Baltimore, Md 569
United Gas Improvement Co., Phila., Pa 561
The American Gas, Light and Heat Co., Phila., Pa 555

INCLINED RETORTS.

Laclede Fire Brick Manuf'g Co., St. Louis, Mo 556

GASHOLDER TANKS.

W. C. Whyte, New York City 562
J. P. Whittier, Brooklyn, N. Y 563

GASHOLDER PAINT.

The Government Waterproof Paint Co., Boston, Mass 557

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J 566
B. Kreischer & Sons, New York City 566
Adam Weber, New York City 566
Laclede Fire Brick Manuf'g Co., St. Louis, Mo 566
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y 566
Borgner & O'Brien, Phila., Pa 566
James Gardner, Jr., Pittsburgh, Pa 566
Henry Maurer & Son, New York City 567
Chicago Retort and Fire Brick Co., Chicago, Ills 566
Baltimore Retort and Fire Brick Co., Baltimore 566
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo 566
Boston Fire Brick Works, Boston, Mass 566

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City 524
R. D. Wood & Co., Phila., Pa 570

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md 569
Fred. Bredel, New York City 567
Chicago Retort and Firebrick Co., Chicago, Ills 566
J. H. Gautier & Co., Jersey City, N. J 567
Adam Weber, New York City 558

GAS GOVERNORS.

Connelly & Co., New York City 563
Fred. Bredel, N. Y. City 567
Friedrich Lux, London, England 578
Wilbraham Bros., Phila., Pa 563

SELF-SEALING MOUTHPIECE DOORS.

Ibsell-Porter Company, New York City 570
James R. Floyd & Sons, New York City 564

TAR AND CARBONIC ACID EXTRACTOR.

Geo. Shepard Page, N. Y. City 560

CEMENTS.

C. L. Gerould & Co., Brooklyn, N. Y 566

GAS ENRICHERS.

Standard Oil Co., Cleveland, Ohio 572

GAS METERS.

John J. Griffin & Co., Phila., Pa 574
American Meter Co., New York and Philadelphia 575
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa 575
Helme & McIlhenny, Phila., Pa 575
D. McDonald & Co. Albany, N. Y 575
Nathaniel Tufts, Boston, Mass 574
Maryland Meter and Manufacturing Co., Baltimore, Md 519
Jones Meter and Stove Co., Royersford, Pa 574
Harris Bros. & Co, Philadelphia, Pa 574

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind 520
Isbell-Porter Company, New York City 570
Wilbraham Bros., Philadelphia, Pa 563
Connelly & Co., New York City 563

GAS COALS.

Penn Gas Coal Co., Phila., Pa 573
Perkins & Co., New York City 572
Despard Coal Co., Baltimore, Md 573
Chesapeake and Ohio R. R. Coal Agency, N. Y. City 573
Westmoreland Coal Company, Phila., Pa 573
J. & W. Wood, New York City 572

CANNEL COALS.

Perkins & Co., New York City 572
J. & W. Wood, New York City 572

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y 555
John McLean, New York City 555
Chapman Valve Manufacturing Co., Boston, Mass 555
R. D. Wood & Co., Phila., Pa 570
The P. H. & F. M. Roots Co., Connersville, Ind 556

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa 576
Clerk Gas Engine Co, Phila., Pa 573
Van Duzen Gas Engine Co., Cincinnati, Ohio 573

ENGINES AND BOILERS.

Jarvis Engineering Co., Boston, Mass 563

STEAM PUMPS.

Van Duzen & Tift, Cincinnati, Ohio 555

GAS LAMPS.

Welsbach Incandescent Gas Light Co., Phila., Pa..... 557
The Siemens-Lungren Company, Philadelphia, Pa..... 557
Fiske, Coleman & Company, Boston, Mass..... 566

PURIFIER SCREENS.

John Cabot, New York City..... 558
Bartlett, Hayward & Co., Baltimore. Md..... 558

GAS STOVES.

American Meter Co., New York and Philadelphia..... 550
The Goodwin Gas Stove and Meter Co., Phila. Pa 540
George M. Clark & Company, Chicago, Ills..... 558
D. McDonald & Co., Albany, N. Y..... 575
Maryland Meter and Manufacturing Co., Baltimore, Md.... 519
Jones Meter and Stove Co., Royersford, Pa..... 575
Chicago Gas Stove Company, Chicago, Ills..... 558

STREET LAMPS.

J. G. Miner, Morrisania, New York City..... 557
Bartlett Street Lamp Man'fg Co., New York City..... 557

BURNERS.

C. A. Gefrorer, Phila., Pa..... 572
Moses G. Wilder, Phila., Pa..... 557

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City..... 520

PURIFYING MATERIAL.

Connelly & Co., New York City..... 563
Friedrich Lux, London, England..... 558
Hill Chemical Company, Brooklyn, N. Y..... 555

COKE CRUSHER.

C. M. Keller, Columbus, Ind..... 573

ELECTRICAL APPARATUS.

Wm. Henry White, N. Y. City..... 571
Fort Wayne Electric Co., Fort Wayne, Ind..... 564

BOOKS, ETC.

1890. Directory. 1890..... 563
King's Treatise..... 573
Practical Electric Lighting..... 573
Electric Light Primer..... 573
American Gas Engineer and Superintendents' Handbook... 567
Digest of Gas Law..... 555
Fuel and its Applications..... 555
Newbigging's Handbook..... 567

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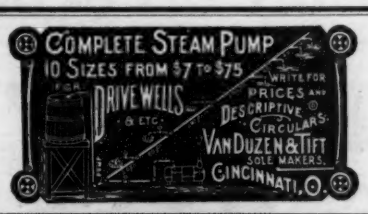
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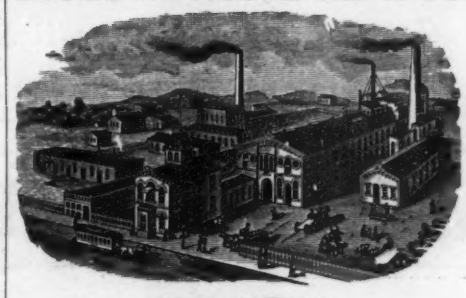

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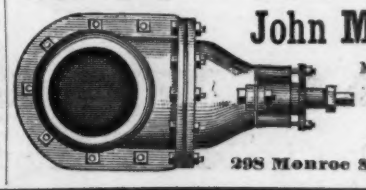

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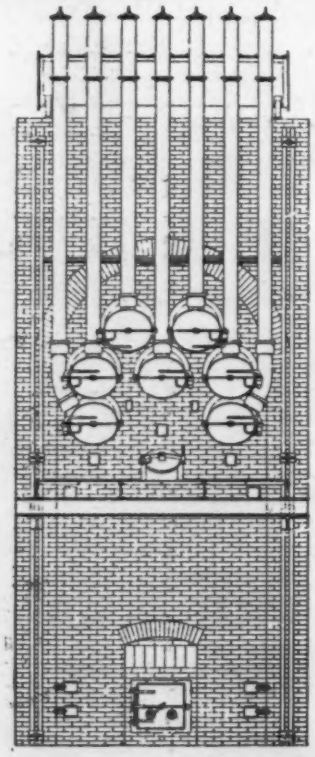

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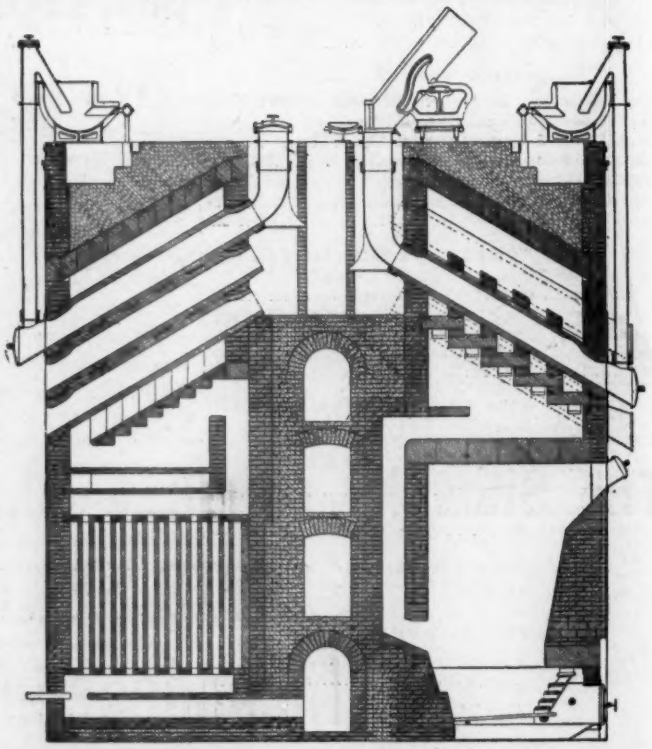

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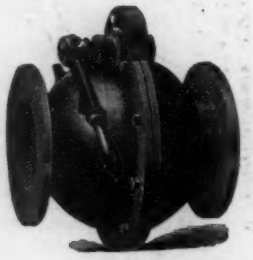

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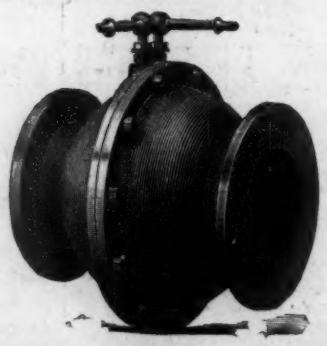

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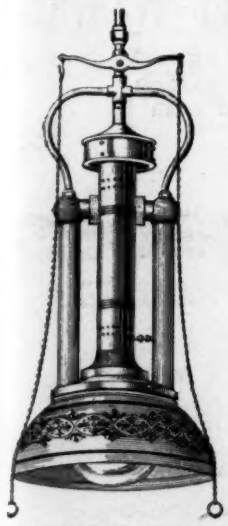
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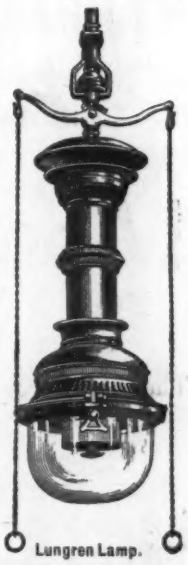
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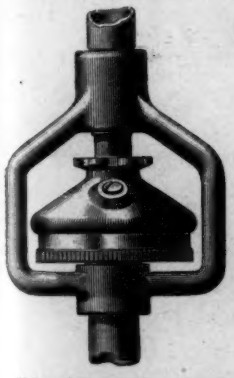

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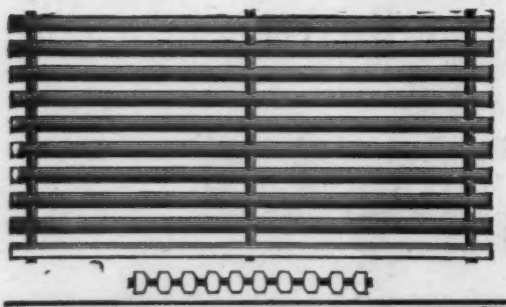

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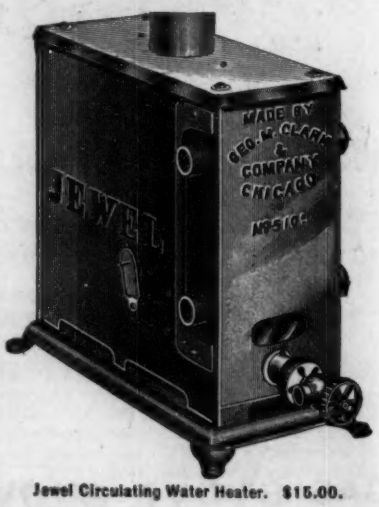

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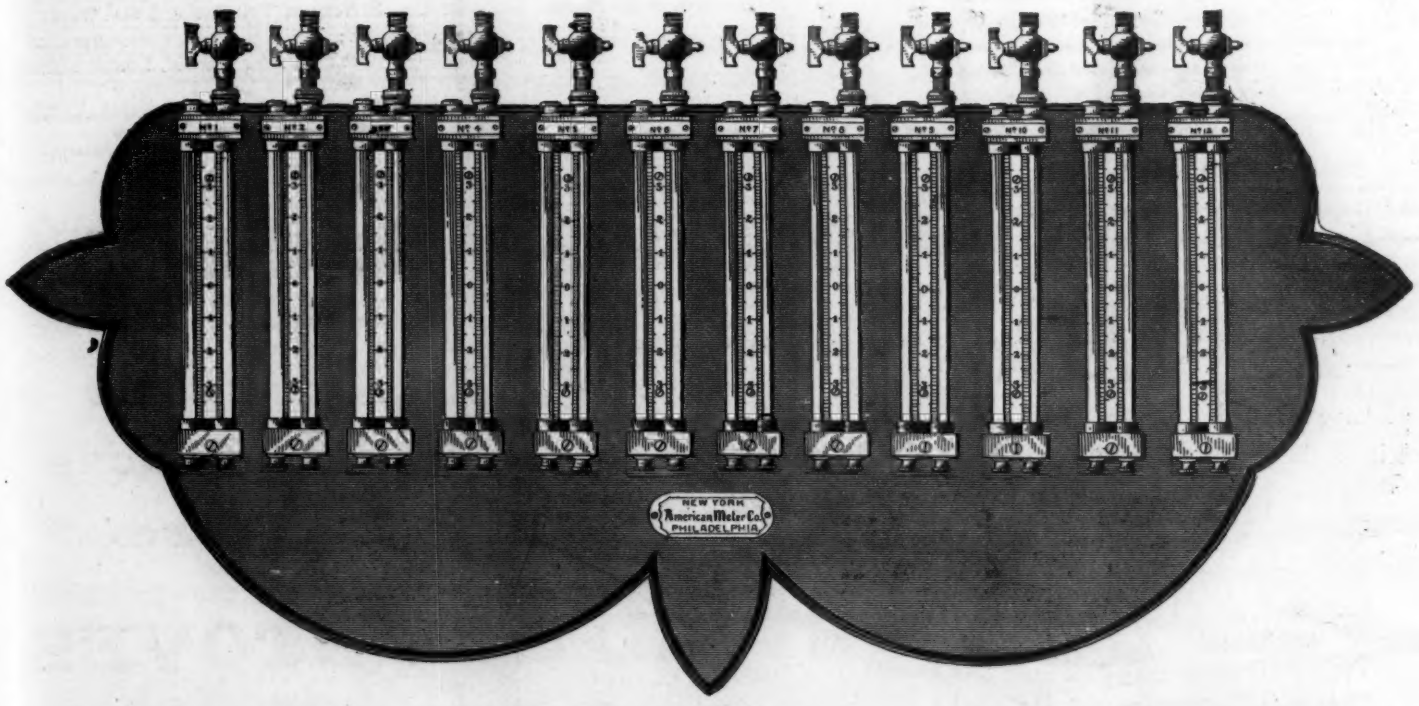

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No. 3,	"	"	250,000	"	"	"	5	"	"	" "
No. 4,	"	"	500,000	"	"	"	6	"	"	" "
No. 5,	"	"	750,000	"	"	"	7	"	"	
No. 6,	"	"	1,000,000	"	"	"	8	"	"	
No. 7,	"	"	1,250,000	"	"	"	9	"	"	" "
No. 8,	"	"	1,500,000	"	"	"	10	"	"	" "
No. 9,	"	"	2,000,000	"	"	"	12	"	"	" "
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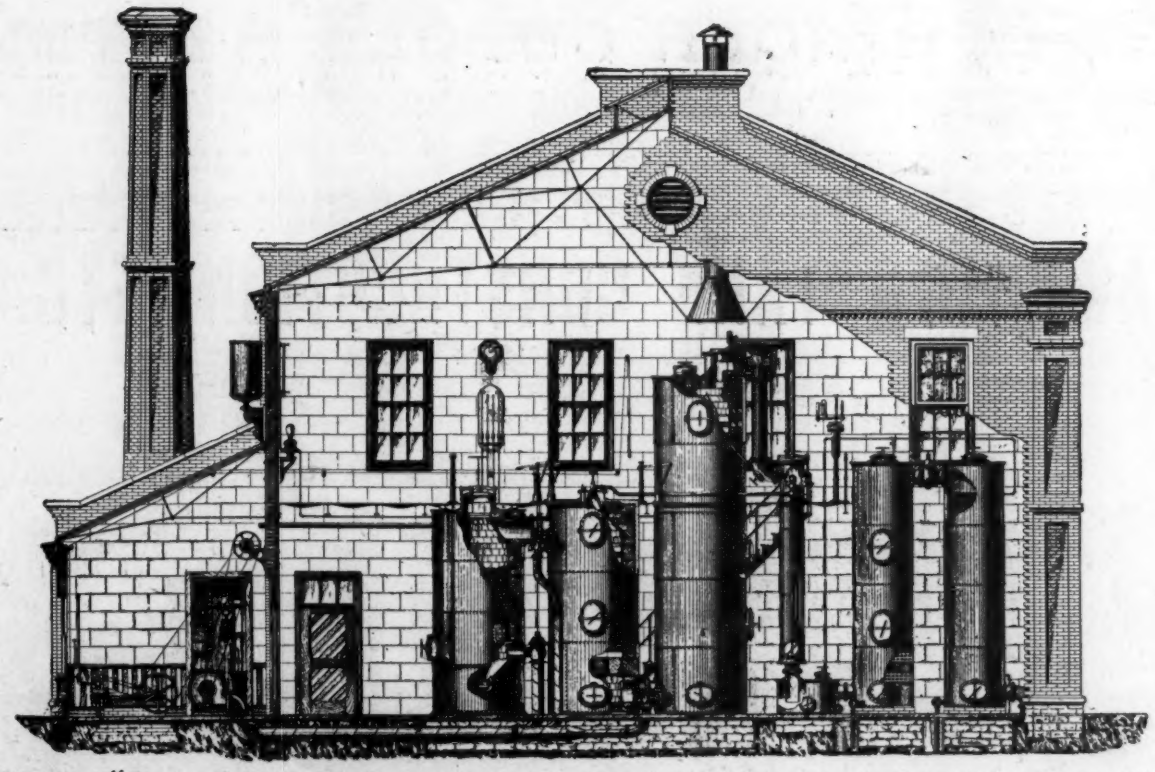

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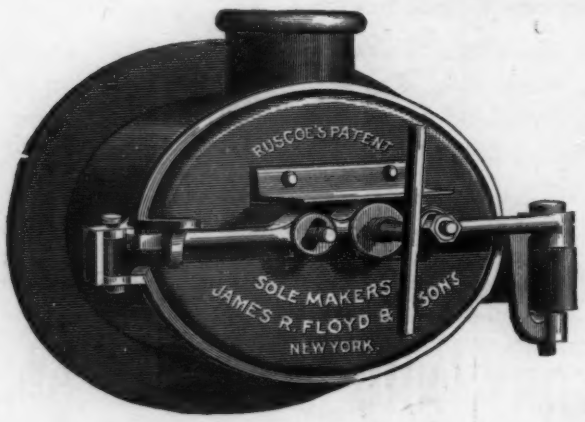

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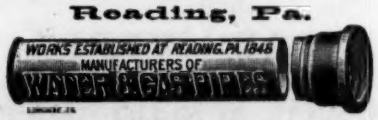

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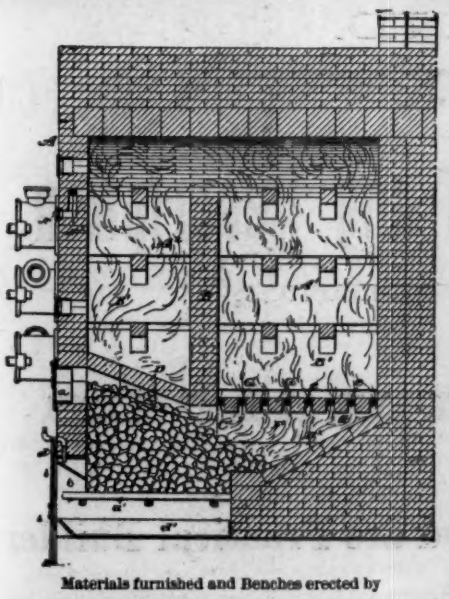

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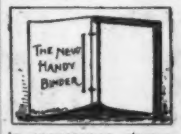

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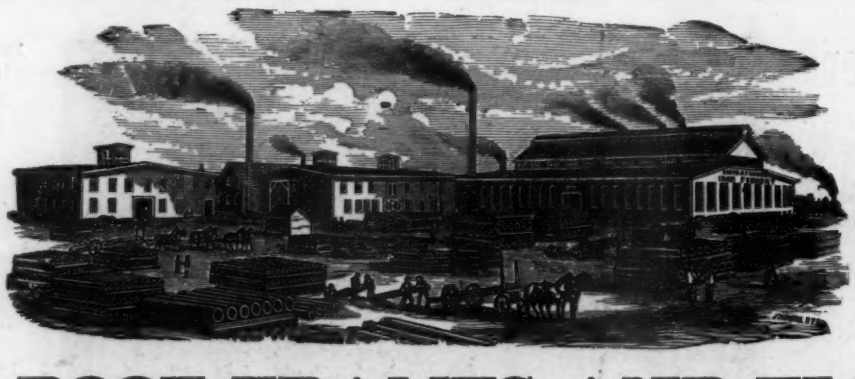

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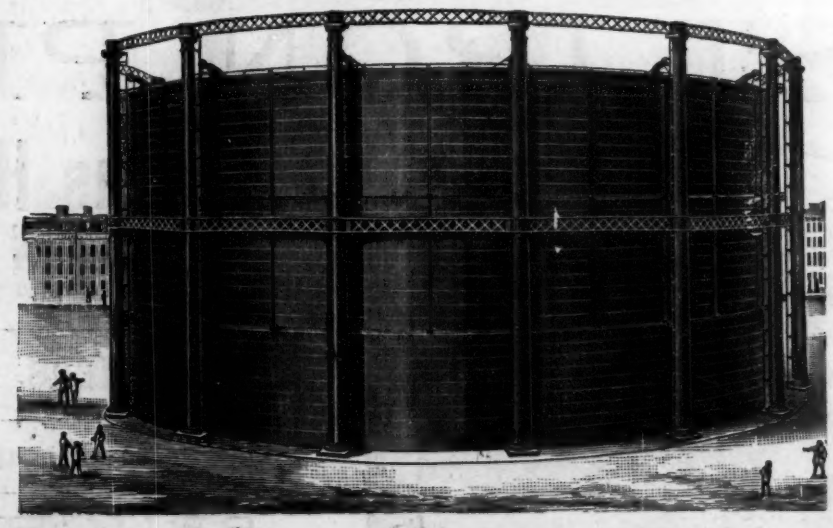

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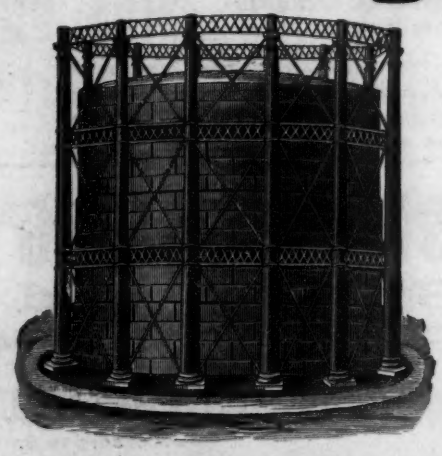

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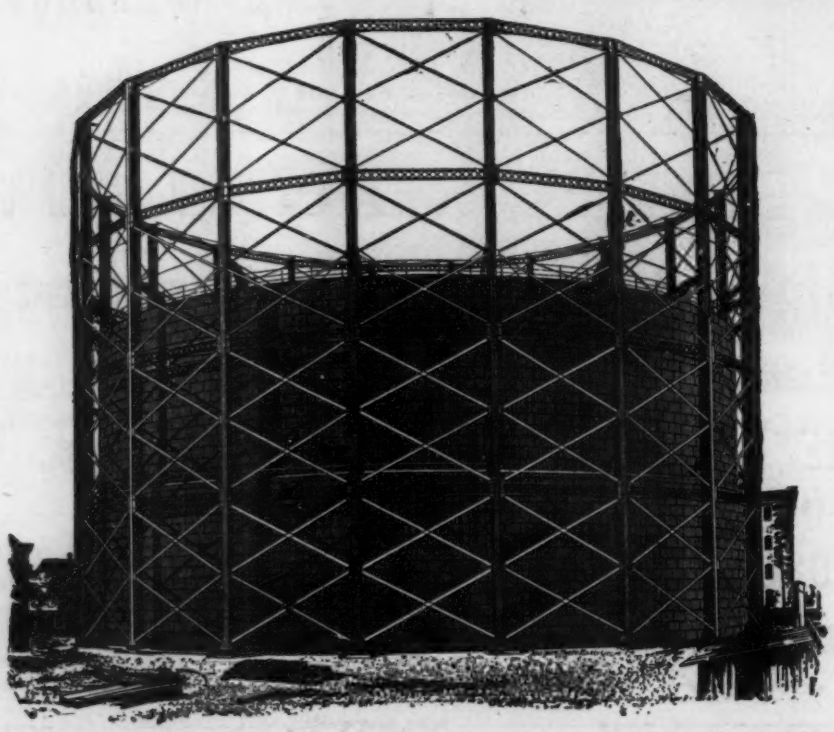

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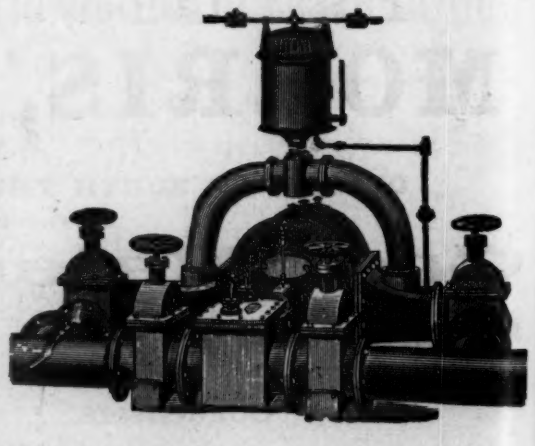

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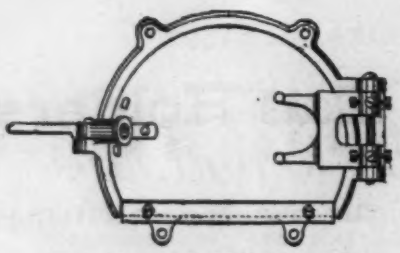

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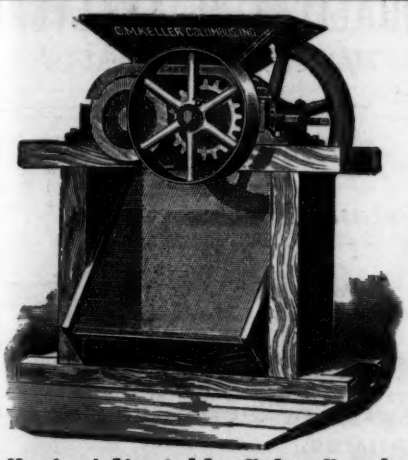

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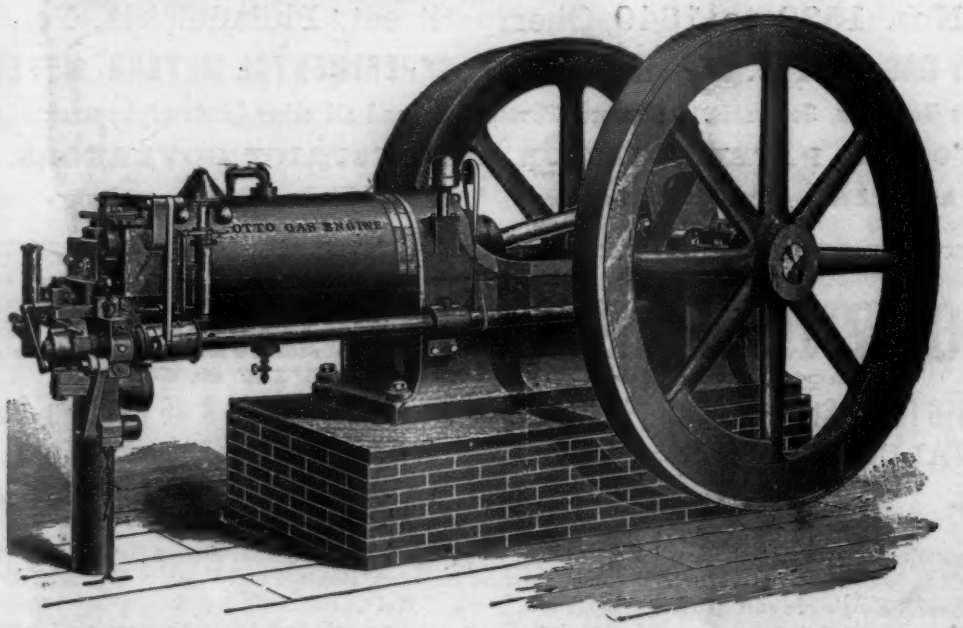

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